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A Review on Study of Buccal Patches

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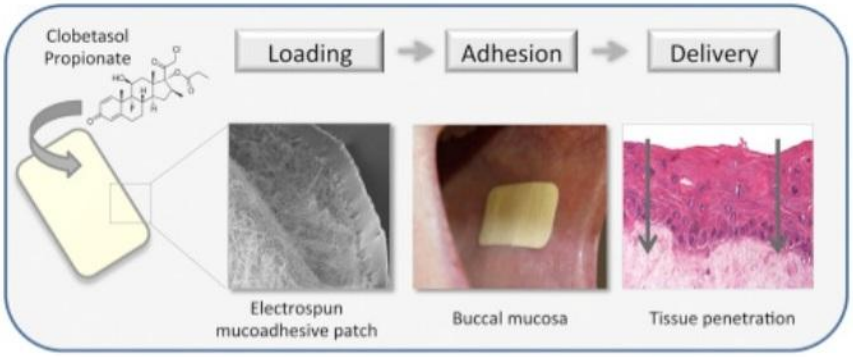
Abstract: *The main barrier for the oral delivery of most of the drugs as potential therapeutic agents is their extensive pre-systemic metabolism, instability in acidic environment resulting into inadequate and erratic oral absorption. Amongst the various routes of drug delivery, oral route is perhaps the most preferred by 4.6 the patients. Within the oral mucosal cavity, the buccal region offers an attractive route of administration for systemic drug delivery. The mucosa has rich blood supply and it is relatively permeable. Considering the low patient compliance of rectal, vaginal, sublingual and nasal drug delivery for controlled release, the buccal route of drug delivery is a good alternative.*

Keywords: Disease Prevalence Estimation System

I. INTRODUCTION

Intraoral cavity consists of palate, buccal, sublingual and gingival mucosa. Disorders associated with intraoral mucosa are associated with adverse side effects of medication, radiotherapy, intraoral contact dermatitis, various syndromes such as Sjögren syndrome and mechanical or traumatically stress such as orthodontic appliances or biting of tongue/lips or cheeks.This study focusses on orthodontic patients as wearing brackets or braces as well as dental restoration resulted in mucosal lesions and major discomfort. State of the art is presented in few remedies of orthodontists preventing or relieving mucosal irritation. Irritation of the mucosa caused by sharp ends of the archwires is diminished by cutting and turning . Moreover, irritation based on ligature wires can be hindered by tucking the wires. Further option displays the addition of wax in order to cover the brackets as prophylactic. Local pain relief in form of gels, ointments and lozenges are products over the counter but not encouraging patience adherence. The pathogenesis of both conditions is not entirely understood and consequently they lack effective clinical management. Current treatment is dependent on immune-modulating steroids to reduce inflammation and pain that are delivered either systemically, which although effective, rapidly induces unacceptable side effects leading to cessation of treatment or alternatively delivered topically by mouthwashes or gels. These topical dosage forms are generally considered suboptimal due to the continuous flow of saliva and mechanical stresses within the oral cavity that result in the active substance being washed away, leading to shorter exposure times and unpredictable drug distribution

GRAPHICAL DESIGN



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II. MATERIALS AND METHODS

Materials

Carboxymethyl cellulose sodium salt (CMC) (medium viscosity), 2-hydroxyethyl cellulose (HEC) (hydroxypropyl)methyl cellulose (HPMC), triethyl citrate (TEC) (98.0%) and chitosan (low molecular mass degree of deacetylation, 83-85%) were all received from Sigma Aldrich (Steinheim, Germany). Propylene glycol (PG) was obtained from Gatt-Koller (Absam, Austria).

Physiological, anatomical features of the oral cavity

The lips, hard palate (the bony front portion of the roof of the mouth), soft palate (the muscular back portion of the roof of the mouth), retromolar trigone (the area behind the wisdom teeth), front two-thirds of the tongue, gingiva (gums), buccal mucosa (the inner lining of the lips and cheeks), and floor of the mouth under the tongue are all parts of the oral cavity. In the following fig. 1 and table 1, it show the composition of the oral cavity and its respective role in drug penetration.

MUCOADHESIVE DRUG DELIVERY SYSTEM IN ORAL CAVITY

Drug delivery via the membranes of the oral cavity can be subdivided as follows

- Sublingual delivery: is systemic delivery of drug through the mucosal membranes lining the floor of the mouth.
- Buccal delivery: is drug administration through the mucosal membranes lining the cheeks.
- Local delivery: is drug delivery into the oral cavity

Advantages of Buccal Delivery

- Bypass the hepatic first pass metabolism and degradation in the stomach and intestine, thereby great bioavailability
- Facilitates removal in emergencies.
- Delivery device can be made unidirectional; only oral mucosal adsorption.
- Buccal mucosa is less prone to damage or irritation than nasal mucosa.
- Used in case of unconscious and less co-operative patients.
- Since the formulation is light, it requires less packing cost and less transport cost.
- The presence of saliva ensures relatively large amount of water for drug dissolution unlike in case of rectal and transdermal route.
- Better patient compliance than vaginal, rectal or nasal routes.

Disadvantages of Buccal Delivery

1. Relatively smaller area of adsorption.
2. The thickness of delivery system should be limited to a few millimetres in order to avoid inconveniences for patient.
3. Part of the drug may be dissolved in the saliva and swallowed.
4. Drug which irritate oral mucosa or bitter taste, or causes allergic reactions, discoloration of teeth cannot be formulated.
5. If formulation contains antimicrobial agents, that affects the natural microbial flora of the mouth/ buccal cavity.
6. The patient cannot eat, drink or speak.
7. Drugs which are unstable at buccal pH cannot be administered by this route

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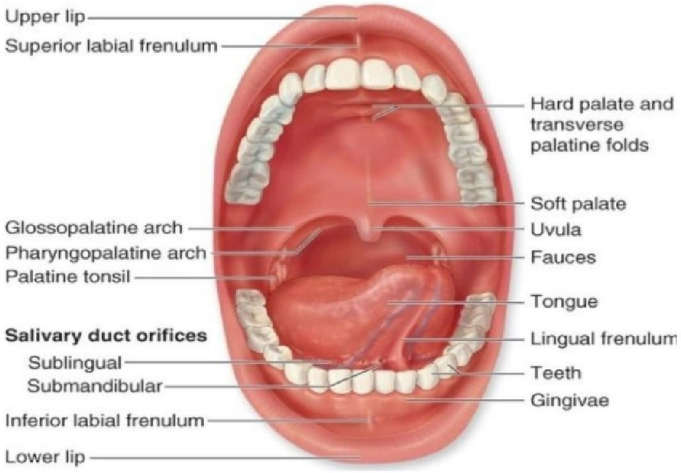

Figure 1: Anatomical structure of Oral Cavity

NOVEL BUCCAL DOSAGE FORMS

The novel type buccal dosage forms include buccal adhesive tablets, patches, films, semisolids (ointments and gels) and powders.

A. Buccal mucoadhesive tablets: Buccal mucoadhesive tablets are dry dosage forms that have to be moistened prior to placing in contact with buccal mucosa. They can deliver drug multi-directionally into the oral cavity or to the mucosal surface.

B. Patches and Films: Buccal patches consists of two laminates or multilayered thin film that are round or oval in shape, consisting basically of adhesive polymeric layer and impermeable backing layer to provide unidirectional flow of drug across buccal mucosa.

C. Semisolid Preparations (Ointments and Gels):

Bioadhesive gels or ointments have less patient acceptability than solid bioadhesive dosage forms, and most of the dosage forms are used only for localized drug therapy within the oral cavity.

D. Powders: Buccal bioadhesive powder dosage forms are a mixture of bioadhesive polymers and the drug and are sprayed onto the buccal mucosa

TYPES OF BCCCAL PATCHES

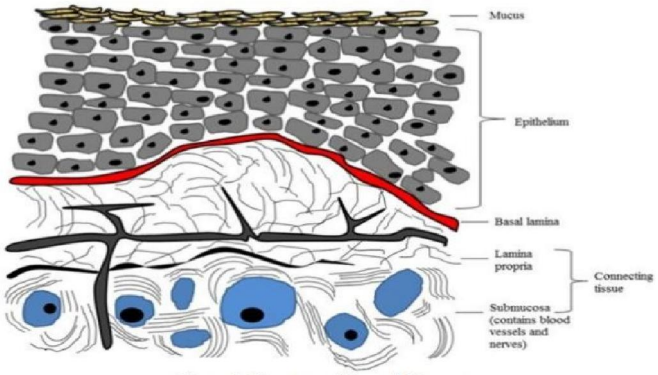

Figure 2: Structure of Buccal Mucosa

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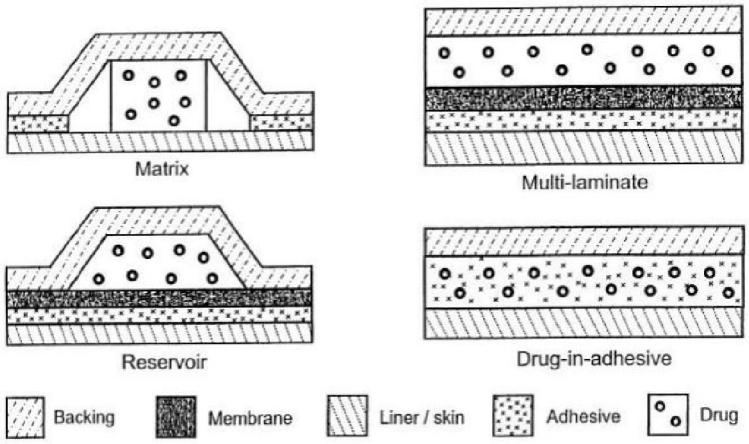
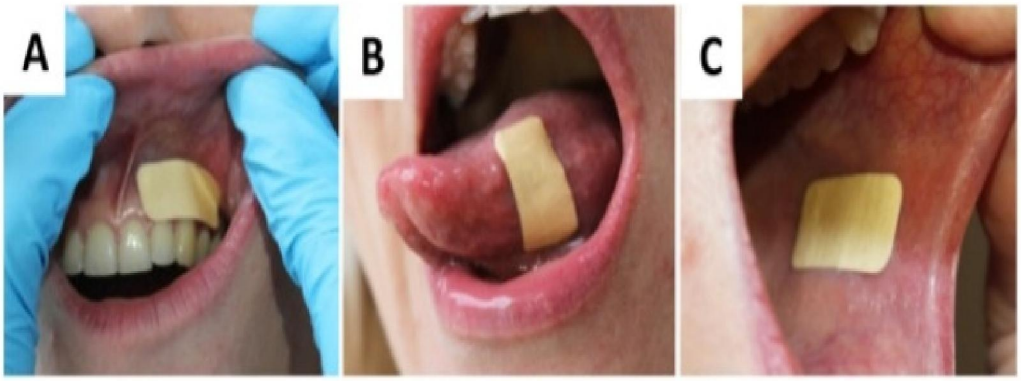
a) Matrix type (Bi-directional): The buccal patch designed in a matrix configuration contains drug, adhesive, and additives mixed together. Bi-directional patches release drug in both the mucosa and the mouth.

b) Reservoir type (Unidirectional): The buccal patch designed in a reservoir system contains a cavity for the drug and additives separate from the adhesive. An impermeable backing is applied to control the direction of drug delivery; to reduce patch deformation and disintegration while in the mouth; and to prevent drug loss. Basically unidirectional types of buccal patches are used for drug delivery in the buccal cavity for local as well as systemic effect.

In vivo mucoadhesive performance and acceptability of the placebo patch



In vivo residence time and patch acceptability was assessed in 26 healthy adult volunteers (15 male 11 female) aged between 21 and 64 years. all volunteers were non-smokers. Residence time was recorded for three locations within the oral cavity; upper labial gingiva, lateral border of tongue and buccal mucosa to a maximum of 120 min. Residence times were highest for the gingival applied patches followed by those on the buccal mucosa with 96% and 46% of patches remaining adherent for the full 120 min, respectively. No patches remained attached to the tongue for the full 120 min. In terms of participants' perception of the patch, 96% of volunteers responding positively with good, very good or excellent when asked to rate the overall adherence of the patches and over 88% of volunteers felt little or no irritation whilst wearing the patches



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Evaluations of buccal patch:-

1. Surface pH:-

Buccal patches are left to swell for 2 hr on the surface of an agar plate. The surface pH is measured by means of a pH paper placed on the surface of the swollen patch.

2. Thickness measurements:-

The thickness of each film is measured at five different locations (centre and four corners) using an electronic digital micrometer.

3. Swelling study:-

Buccal patches are weighed individually (designated as W1), and placed separately in 2% agar gel plates, incubated at 37°C ± 1°C, and examined for any physical changes. At regular 1-hour time intervals until 3 hours, patches are removed from the gel plates and excess surface water is removed carefully using the filter paper.

III. CONCLUSION

The buccal mucosa offers several advantages for controlled drug delivery for extended periods of time. The mucosa is well supplied with both vascular and lymphatic drainage and first-pass metabolism in the liver and pre-systemic elimination in the gastrointestinal tract are avoided. The area is well suited for a retentive device and appears to be acceptable to the patient. With the right dosage form design and formulation, the permeability and the local environment of the mucosa can be controlled and manipulated in order to accommodate drug permeation. Buccal drug delivery is a promising area for continued research with the aim of systemic delivery of orally inefficient drugs as well as a feasible and attractive alternative for non-invasive delivery of potent peptide and protein drug molecules. However, the need for safe and effective buccal permeation/absorption enhancers is a crucial component for a prospective future in the area of buccal drug delivery.

REFERENCES

[1]. Allen LV, Popovich NG, Ansel HC. Ansel's pharmaceutical dosage forms and drug delivery systems. 8th ed. Philladelphia: Lippincott Williams & Wilkins; 2010. [Google Scholar]

[2]. Swarbrick J, Boylan JC. Encyclopedia of pharmaceutical technology. New York: Marcel Dekker; 2002. [Google Scholar]

[3]. Altomare E, Vendemiale G, Benvenuti C, Andreatta P. Bioavailability of a new effervescent tablet of ibuprofen in healthy volunteers. Eur J ClinPharmacol. 1997;52(6):505–6. [PubMed] [Google Scholar]

[4]. Monrle R. Effervescent tablet in: Liberman HA, Lachman I, Schwartz J. Pharmaceutical dosage form: tablets, 2nd ed. New York: Marcel Dekker Inc; 1980.

[5]. Callhan JC, Cleary GW, Elafant M, Kaplan G, Kensler T, Nash RA. Equilibrium Moisture Content of Pharmaceutical Excipients. Drug Dev Ind Pharm 1982 8(2):355-69. [Google Scholar]

[6]. Saleh SI, Boymond C, Stamm A. Preparation of direct compressible effervescent components: spray- dried sodium bicarbonate. Int J pharmaceut. 1988;45(1-2):19–26. [Google Scholar]

[7]. Sweetman SC. Martindle: The complete drug refrence, 35th ed. London: pharmaceutical press; 2007.

[8]. Tekin A, Tekgul S, Atsu N, Bakkaloglu M, Kendi S. Oral potassium citrate treatment for idiopathic hypocitruria in children with calcium urolithiasis. J Urol. 2002;168(6):2572–4. [PubMed] [Google Scholar]

[9]. Pak CY, Sakhaee K, Fuller C. Successful management of uric acid nephrolithiasis with potassium citrate. Kidney Int. 1986;30(3):422–8. [PubMed] [Google Scholar]

[10]. Pak CY, Peterson RD, Poindexter J. Prevention of spinal bone loss by potassium citrate in cases of calcium urolithiasis. J Urol . 2002;168(1):31–4. [PubMed] [Google Scholar]

[11]. McEvoy GK. AHFS Drug information. Bethesda, MD: American society of health-system pharmacists; 2005. [Google Scholar]

[12]. Aulton ME. The science of dosage form design. 2nd ed. New York: Churchil living stone; 2002. [Google Scholar]

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[13]. United States Pharmacopeia 31/National Formulary 26. Rockville MD USA: United States Pharmacopeial Convention; 2008.

[14]. Yanze FM, Duru C, Jacob M. A process to produce effervescent tablets: Fluidized bed dryer melt granulation. Drug Dev Ind Pharm. 2000;26(11):1167–76. [PubMed] [Google Scholar]

[15]. Brich GG, Green LF, Coulson CB. Sweetness and sweetners. London: Applied science publisher LTD; 1981. [Google Scholar]

[16]. Prabhakar CH, Krishna KB. A review on effervescent tablet. Int J Pharm Technol. 2011;3(1):704–12. [Google Scholar]

[17]. Agrawal R, Naveen Y. Pharmaceutical processing – A review on wet granulation technology. Int J Pharm Front Res. 2011;1(1):65–83. [Google Scholar]

[18]. Amela J, Salazar R, Cemeli J. Methods for the determination of the carbon dioxide released from effervescent pharmaceuticals. J pharm bely. 2000;55(2):53–6.