Review On Buccal Patches

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Abstract:

Buccal route is an attractive route of administration for systemic drug delivery and it leads direct access to the systemic circulation through the internal jugular vein bypasses drugs from the hepatic first pass metabolism provides high bioavailability. Buccalbioadhesive films, releasing topical drugs in the oral cavity at a slow and predetermined rate, provide distinct advantages over traditional dosage forms for treatment of many diseases. This article aims to review the recent developments in the buccal adhesive drug delivery systems to provide basic principles to the young scientists, which will be useful to circumvent the difficulties associated with the formulation design

Key Words : Buccal Mucosa, Buccal Patch/Film, Permeation, Transmucosal, Buccal Drug Delivery, Mucoadhesive**.**

Introduction : Localized drug delivery to oral cavity tissues has been studied for the remedy of periodontal sickness, bacterial contamination, and fungal infection many of the numerous routes of administration attempted up to now within the novel drug delivery systems.[1] Mucoadhesion has won popularity over the years because of its ability to improve localized drug shipping by preserving a dosage form on the of site of movement.[2] these benefits consist of feasible skip offirst bypass effect, avoidance of pre systemic elimination within the GI tract, and depending on the precise drug, a better enzymatic flowers for the drug absorption. amongst the various routes of administration tried to date in the novel drug shipping systems, localized drug transport to tissues of the oral cavity has been investigated for the remedy of periodontal disease(gum contamination), bacterial and fungal contamination[3]

Advantages :

1. First pass metabolism is avoided.
2. Inhibits acid /enzyme metabolism.
3. In case of toxicity, administration and removal of drug is easy.
4. With respect to parental, patient compliance is good.
5. With respect to skin and TDDS (4-4000), permeation is faster.
6. Blood supply is rich
7. Compared to sub lingual mucosa surface area is large.[4,6]

Dis Advantages

1. Not suitable for children.
2. Difficulty in drinking and eating.
3. Surface area is less compared to skin.
4. Drugs which have bitter taste or which cause irritant to mucosa or having

i. Noxious Smell

5. These can cause salivary erosion which enter GIT and choke oesophagus.
6. Unstable at buccal pH (6.5 to 7) cannot be administere [5,7]

Diagram:

a) Diagram: Normal Oral Mucusa Cross-section
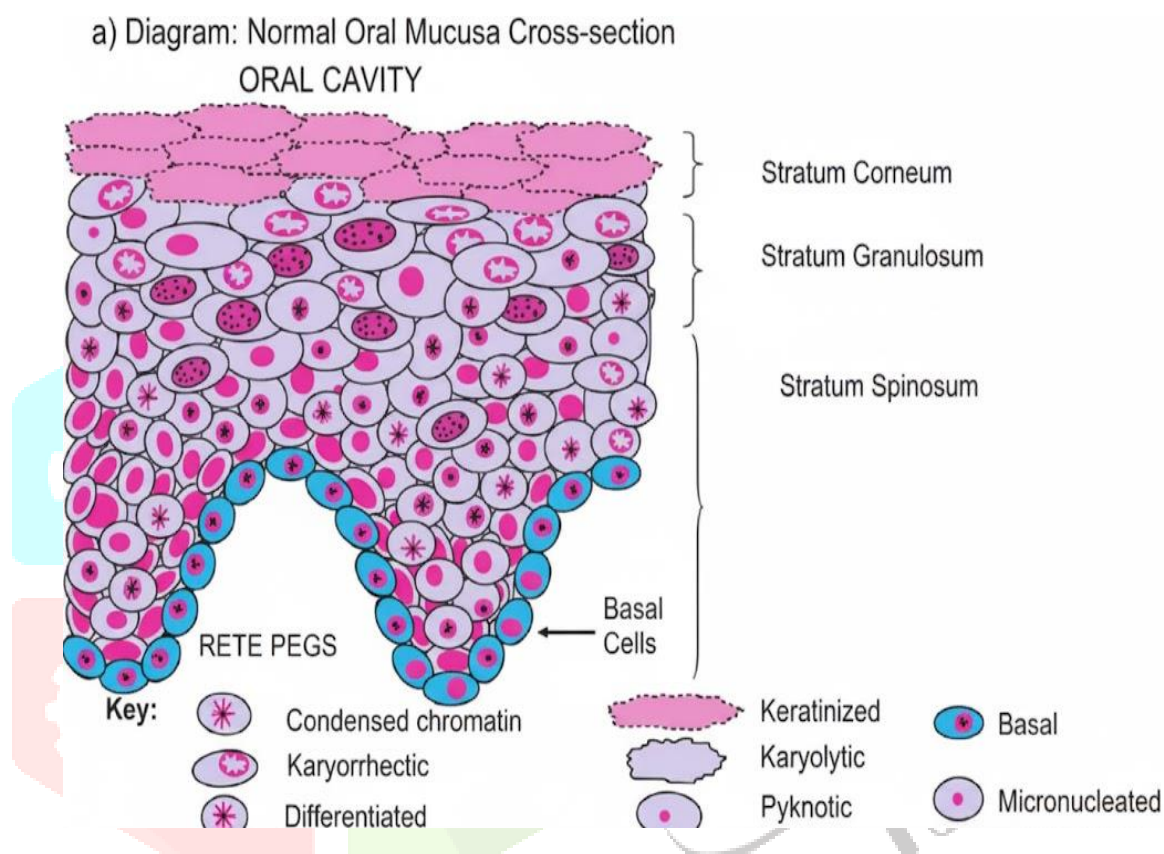
Limitations in buccal patches:-

- Patients can control the period of administration or terminate delivery in case of emergencies.
- The area of absorptive membrane is relatively smaller. If the effective area for absorption is dictated by the dimensions of a delivery system, this area then becomes even smaller
- The area of absorptive membrane is relatively smaller. If the effective area for absorption is dictated by the dimensions of a delivery system, this area then becomes even smaller.
- 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. Involuntary swallowing of saliva results in a major part of dissolved or suspended released drug being removed from the site of absorption. Furthermore, there is risk that the delivery system itself would be swallowed.
- Drug characteristics may limit the 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 may limit the drug candidate list for this route. Conventional type of buccal drug delivery systems did not allow the patient to concurrently eat, drink or in some cases,talk.[8]

Oral mucosal sites:-

Within the oral mucosal cavity,delivery of drugs is classified in to three categories

1. Sublingual delivery: is the administration of the drug via the sublingual mucosa (the membrane of the ventral surface of the tounge and the floor of the mouth to the systemic circulation.

2. Buccal delivery: is the administration of drug via the buccal mucosa(the lining of the cheek)to the systemic circulation

3. Local delivery: for the treatment of conditions of the oral cavity, principally ulcers, fungal conditions and periodontal disease.

These oral mucosal sites differ greatly from one another in terms of anatomy, permeability to an applied drug and their ability to retain a delivery system for a desired length of time.[9,10]

Components or structural feature of oral cavity (fig 2):-
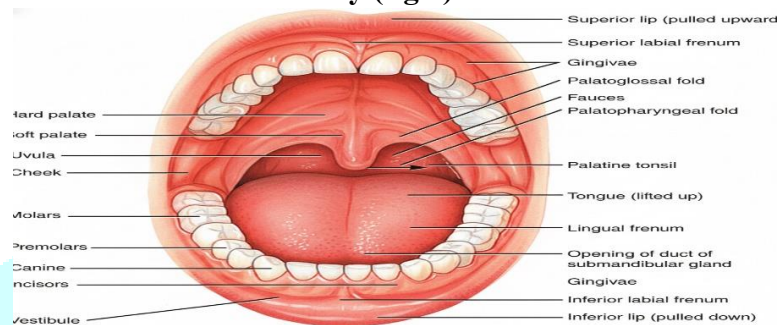
- Oral cavity is that area of mouth delineated by the lips, cheeks, hard palate, soft palate and floor of mouth. The oral cavity consists of two regions.

- Outer oral vestibule, which is bounded by cheeks, lips, teeth and gingival (gums).

- Oral cavity proper, which extends from teeth and gums back to the fauces (which lead to pharynx) with the roof comprising the hard and soft palate.

- The tongue projects from the floor of the cavity[11,12]

EVALUATION PARAMETERS OF BUCCAL PATCHES:

1. Surface pH: On the surface of the previously prepared agar media buccal patches are applied for about one hour, then by employing pHpaper on the surface of swollen patch pH was determined.

2. Thickness measurements: For measuring thickness screw gauge with a least count of 0.01 thickness is used. At five different places thickness is measured and average value was determined.

3. Folding endurance: Number of times patches could be doubled repetitively till it broke folding endurance can be accomplished.

4. Swelling study: In 1.5% agar gel plate previously weighed buccal patch is placed and is incubated at 37±1º C. the patch is removed from the petri dish for one-hour intermissions up to 3h then by using filter paper surface water is desiccated. The swollen patch is removed and finally swelling index is estimated.

5. Thermal analysis study: Using differential scanning calorimeter thermal analysis can be executed.

6. Buccalpatches morphological characterization: Morphological characterization of buccal patches can be done by scanning electron microscopy.

7. Permeation evaluation of buccal patch: For permeation evaluation, phosphate buffer is filled in a receptor compartment, the hydrodynamics of receptor compartment is sustained by mixing at 50rpm with a magnetic bead. samples are withdrawn at predetermined time intermissions and drug content is evaluate[13,14]

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)   1.Parmar HarshadG et al;" Buccal Patches : A Technical Note"; 2012; 029.

2)   M.M.Veillard et al., "Preliminary Studies of Oral Mucosal Delivery of Peptide Drugs," J. Controlled Release , 1987;1(2):123131 .

3)   Y. Kurosaki et al., "Effects of Surfactants on the Absorption of Salicylic Acid from Hamster Cheek Pouch as a Model of Keratinized Oral Mucosa," Int. J. Pharm. 1988;4(7):13-19

4)   Shereen Ahmed Sabry, Sodium Cromoglycate Mucoadhesive Buccal Patches: Design, Fabrication, In vitro and In vivo Characterization, International Journal of Applied Pharmaceutics, Vol-10, Issue-2, 2018; 0975-7058.

5)   Puratchikody, Prasanth v.v , sam T. Mathew, ashok kumar B, buccal drug delivery: past present and future- a review, international journal of drug delivery 3,2011, 171-184.

6)   Ashutosh Roda, Prabhakara Prabhu, Akhilesh Dubey, Design and Evaluation of Buccal Patches Containing Combination of Hydrochlorothiazide and Atenolol, International Journal of Applied Pharmaceutics, Vol-10, Issue-2, 2018; 0975- 7058

7)   A review on bioadhesive buccal drug delivery systems: current status of formulation and evaluation methodsP Chinna Reddy [1,2], KSC Chaitanya [2], Y Madhusudan Rao [2,*]

8)   Zhang.J et al, An In Vivo Dog Model for Studying Recovery Kinetics of the Buccal Mucosa Permeation Barrier after Exposure to Permeation Enhancers Apparent Evidence of Effective Enhancement without Tissue Damage, Int. J. Pharm, 1994, 101, 15–22

9)   Shojaei Amir H, Buccal Mucosa As A Route For Systemic Drug Delivery:

10)   A Review;J Pharm Pharmaceut Sci (www.ualberta.ca/~csps) 1998;1 (1):15- Sevda Senel, Mary Kremer, Katalin Nagy and Christopher Squier,   Delivery of Bioactive Peptides

11)   Giradkar KP et al, Design development and in vitro evaluation of bioadhesive dosage form for buccal route, International journal of pharma research & development, 2010, 2. Shalini Mishra*, G. Kumar, P. Kothiyal Vol. 1 No. 7 2012

12)   Leung SS and J.R. Robinson, Polymer Structure Features Contributing to Mucoadhesion II, J. Contr.Rel, 1990, 12, 187–194.

13)   Surya N. Ratha Adhikari, Bhabani SNayak, Amit K. Nayak, and Biswaranjan Mohanty, Formulation and Evaluation of Buccal Patches for Delivery of Atenolol, AAPS PharmSciTech, Vol-11, Issue-3, 2010.

14)   Koyi, P.K., Khan, A.B., Buccal Patches: A Review, IJPSR, Vol-4, Issue-1, 2013, 83