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Open Access REVIEW

A Comprehensive Review on the Buccal Delivery System

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ABSTRACT

A method that delivers medications in the systemic circulation and avoids the pre-systemic metabolism, such as intranasal, buccal, transdermal, and pulmonary routes, came into awareness to address these issues. This review deals with literature inclusion from the PubMed, Scopus, Web of Science and other reputed platforms. This article focuses on the merits, demerits, muco-cohesion mechanisms of buccal delivery system. A muco-adhesion is described as an interfacial adhesion in which a force of attraction holds one artificial mucoadhesive polymer and the opposing mucin layer (mucosal tissue) together. It has numerous advantages over other routes of administration with few drawbacks. In novel drug delivery system, mucoadhesive films/patches were developed to boost bioavailability and lower systemic toxicity. In conclusion, by increasing intrinsic or efficacy activity, it helps the target therapy. It has shown how mucoadhesive substances with quick and systemic potential work. Therefore, this strategy has become essential in the case of emergency treatment.

Keywords: Buccal drug delivery system, NDDS, merits, limitations.

INTRODUCTION

The site of drug administration in oral cavity includes three ways according to their site of absorption such as sublingual (beneath the tongue), buccal route (inside the cheeks) and gingival (through gums). It sustains drug absorption and prolongs the drug action. Advancement of new drug molecule is costly [1].

Even though the oral cavity is the preferred route of delivery for most drugs, it has several disadvantages, including liver enzyme degradation, gastrointestinal disruption, and first pass metabolism. In order to solve these problems, a pathway was created that allows for the delivery of medications via intranasal, buccal, transdermal, and pulmonary routes while avoiding pre-systemic metabolism. Depending on where a medicine is absorbed, there are three various ways to give it in the oral cavity: sublingual, buccal and gingival- through gums. It keeps drug absorption at a constant level and prolongs the time the medicine is active [2].

Making of a current drug molecule from a regular structure to an original delivery system can altogether work on its exhibition i.e., well consistence, safety & efficacy. Being NDDS a current drug moiety that can give another life. A suitably planned NDDS can be a serious step forward for taking care of conflicts in drug delivery at explicit site with explicit rate. Need for delivering systems to patients productively and with rare anxious effects has incited drug organizations to take part in the improvement of NDDS. This article covers the essential data in regards to Novel Drug Delivery Systems and furthermore various sorts of something very similar [3].

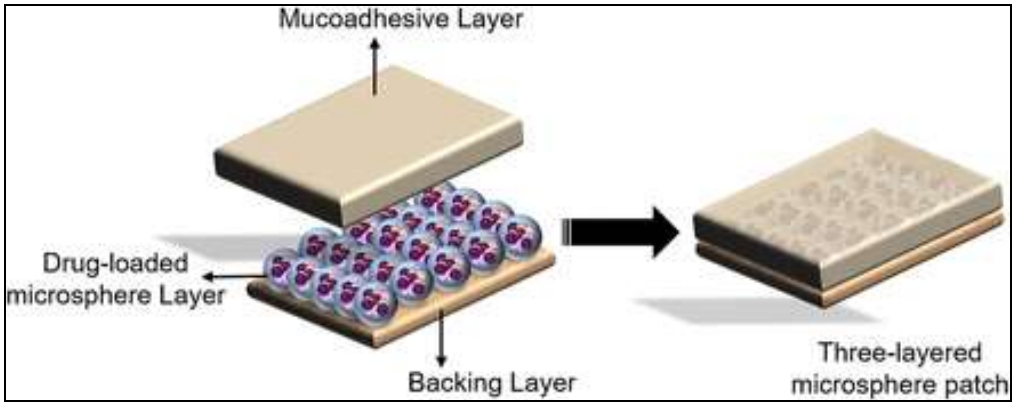

Fig 1. Diverse layers of mucoadhesive patch

The delineated squamous epithelium is found in buccal mucosa that focused on site for drug delivery quite a while prior. Demerits with the oral course of organization like broad digestion by the liver, drug corruption in the g.i.t. lot due to unforgiving climate, and obtrusiveness in parenteral manufacturers can be settled by assisting the drug thru buccal layer. The buccal course appears to offer various benefits, similar to great availability, the power of epithelial layers, utilization of the dose structure in understanding with need, and similarly less defenselessness to movement- enzymatic. Thus, cement mucosal measurements structures were ready for delivery- oral, in the type of glue pills, glue gels and glue patches. The delivery of lipid soluble agents by means of buccal layer was made conceivable by the joining of assimilation or saturation enhancers, which could lessen hindrance properties of epithelial tissues in buccal system. The permeation of hydrophilic medication through the film is one of the significant restricting variables for the improvement of bio-adhesive delivery of medicaments. The epithelial tissues of buccal mucus layer are the fundamental obstruction for the retention of medications. Expanded saturation of the medicaments thru the buccal film and avoidance of the medication corruption by catalysts was accompanied by changing the preliminary qualities of medication. Various formulations have been explored and developed for the drug delivery through the mucus membrane of buccal cavity which include solids like tablets, patches, films, lozenges, wafers, microparticles; liquids dosage forms like solutions and suspensions; semisolid dosage forms like creams, gels, ointments, emulgels and chewing gums and sprays [4].

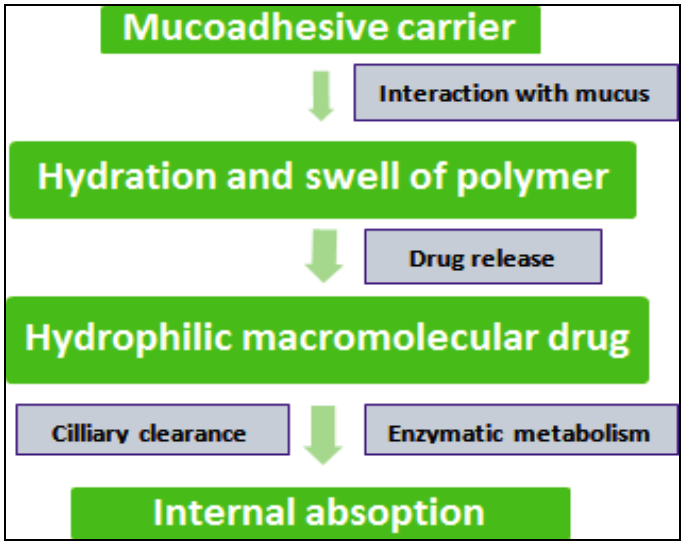

Fig 2. Mechanism of internal drug absorption

On the other hand, working on the attachment and delivery attributes of buccal conveyance gadgets builds the measure of medication accessible to absorption. Joining of ingestion enhancers to buccal detailing is one intriguing methodology. Chelation of steroidal chemicals with cyclodextrins was not viable in expanding the saturation through buccal course, though buildup results of cyclodextrin or epichlorohydrin had the option to shape buildings with estradiol, testosterone, and progesterone, along these lines upgrading ingestion through the buccal film in people [5].

A novel drug delivery advanced technologies makes the tasks into goal of drug delivery. The emerging explorations and developments in advanced technologies, traditional drug delivery routes are commonly used by versatile and sophisticated methods of new drug discovery. Oral transmucosal route is most preferable route for systemic delivery. It is the most preferable and attractive route for the administration of drug as it gives some merits for patients over other injectable & enteral methods. During the last decade it has been thoroughly investigated to overcome drawbacks of the orally delivered drug via GI tract. The oral transmucosal system bypasses the hepatic pre-systemic metabolism led to higher bioavailability whereas oral mucosa having small surface area which may lead to drug loss because of uncontrolled salivary flow and uncontrolled swallowing [6].

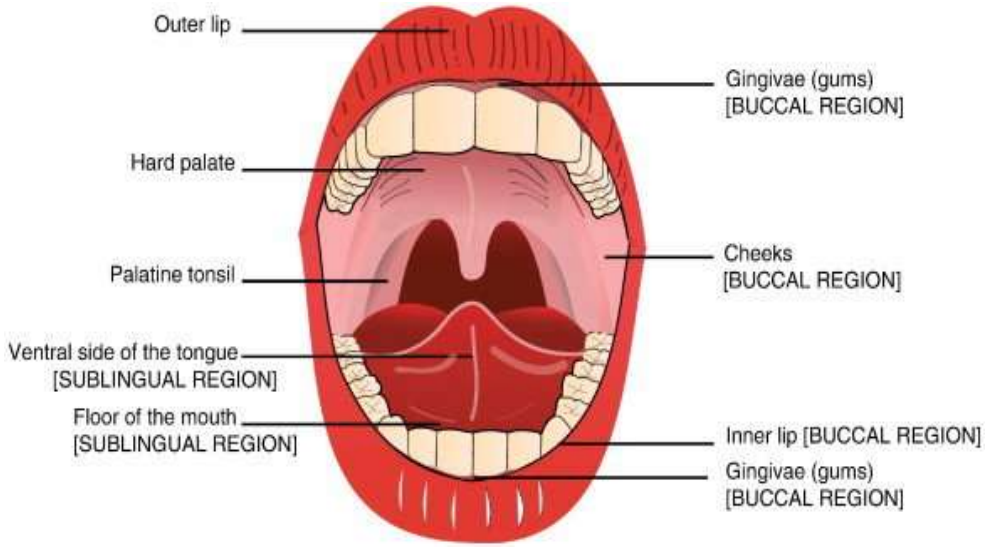

Fig. 3. Diagram of buccal cavity

Oral cavity

It is the first region of digestive system. For the local and systemic therapy oral mucosal cavity provides an attractive route for the administration of drug because has an outstanding penetrability and reasonable patient compliance. Oral cavity is outlined by the hard & soft palate, cheeks, lips, and mouth floor.

It may be divided into two regions. The first one is the oral cavity involving mouth floor, hard palate, soft palate, and tonsil whereas the second one involves outer oral vestibule, surrounded by the cheeks and lips. The drug undergoes systemic absorption by means of capillaries and arteries. The blood is supplied to oral cavity bythe major artery called external carotid artery. The veins backflow the blood by meansof bunches of veins and capillaries lastly absorbed by the jugular vein [7][8].

a. Buccal delivery

For delivery via the buccal pathway, adhesive mucosal dosage structures such as gels, patches, and adhesive unit dosage forms have been developed. The primary barrier preventing drugs from being absorbed is the epithelium, which forms internal linings.

By making some physicochemical modifications, it is possible to reduce the rate of drug degradation by enzymes and facilitate drug penetration through the mucus buccal layer. Using a permeation enhancer increases permeability through buccal mucosa [9].

b. Sublingual

A possible method for more rapid and direct drug absorption into the bloodstream is sublingual pharmaceutical delivery. Sublingual area of buccal cavity is typically permeable for medication consumption. A range of medicine and patient needs are addressed by new sublingual advancements, including better life-cycle control and advantageous dosing for dysphagic paediatric, geriatric, and psychiatric patients [10].

c. Local

In particular for periodontal pockets, the local drug delivery method has the potential for controlled release qualities that offers an actual but constrained and beneficial response. Absorption of bioactive combinations

through mucosa can increase bioavailability since this pathway skips pre-systemic digestion and passes through the gastrointestinal tract [11].

Limitations

These are few limitations found in buccal delivery as below-

- Medicines that remain not stable at saliva pH level
- Medicines with bitter taste or can irritate the mucosa cannot be taken thru this route
- Potent drugs only can be given
- Only passively absorbed medicines can be used
- Eating/ drinking restrictions (at the time of delivery)

One of the typical polymers that is typically widely used is chitosan. Glucosamine and N-acetyl glucosamine, both components of mammalian tissue, are used to make chitosan. It is safe, biocompatible, and degrades naturally. This polymer's film is regarded as having cross section moulding restrictions. Chitosan is frequently used for its properties as a protein inhibitor and an entrance enhancer [12]

Features of ideal mucoadhesive [13]

An ideal mucoadhesive must have the below properties-

1. Ability of fast adherence
2. Sustained drug release
3. Increased BA
4. Excellent patient adaptability
5. Should not hinder general functions
6. Should not exhibit dental caries
7. Safe

Muco-adhesion- Mechanism

Two materials, one artificial like a mucoadhesive substance and other the mucin layer of mucus membrane is joined together by an interfacial force of attraction in a process known as muco-adhesion [14]. An artificial moiety that can interact with mucus layers and keeps bind them together for prolonged or delayed time is known as a muco-adhesive.

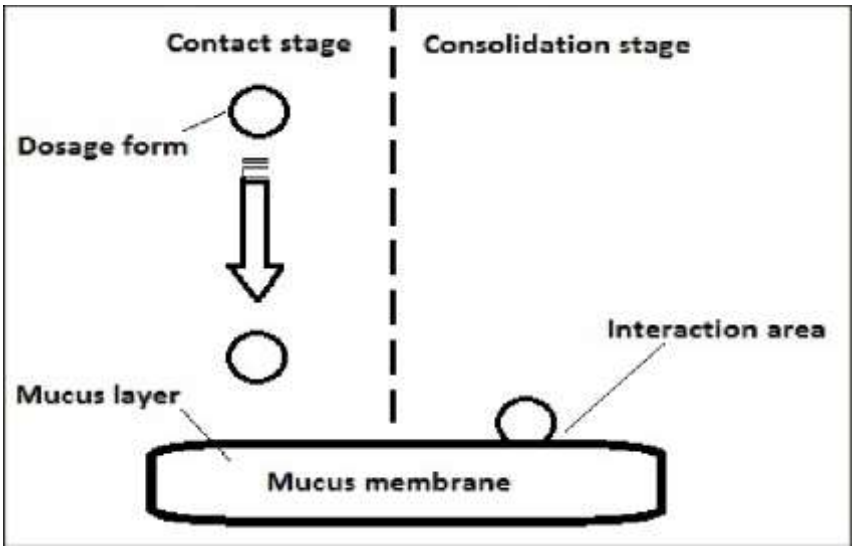

Fig 4. Depiction of mucoadhesive mechanism

Type 1: The adhesion b/w 2 biological stages i.e., platelets adjoining & wound's recovery.

Type 2: Includes phenomena like the adsorption of a biological phase to a synthetic substrate, the development of biofilms on artificial devices, the adsorption of cells to culture dishes, and inserts.

Type 3: Refers to the adhesion of a synthetic material to biological particle as a model for dental enamel sealants.

The term bioadhesion for drug delivery represents drug's carrier attachment to its respective binding site. Receptor's surface can made of mucus-coated tissues or epithelial tissue. The process whereby an adhesive adheres to a mucus coat is known as mucoadhesion. Contrary to popular belief, bioadhesion-the term for the attachment of a polymer to a biological membrane-is not the same as mucoadhesion [15].

Advantages of Mucoadhesive patches [16]

It offers a few benefits over other oral controlled delivery patterns by uprightness of prolongation of stay time of medication in g.i.t. [17].-

- ✓ Targeting and localization of the measurement structure at a particular site.
- ✓ It provides highly vascularized medium for ingestion.
- ✓ Inhibit pre-systemic metabolism.
- ✓ Patient compliance
- ✓ It enhances the BA.
- ✓ Additionally, the mucoadhesive system is known to give personal contact between dose structure and the absorptive mucosa, bringing about high drug motion at the absorbing site.
- ✓ It is effective if patient is un-conscious.
- ✓ Buccal medication delivery has a high patient acceptance.

Disadvantages of buccal delivery system [18]

The following points emphasizes as below-

- Minimum penetrability of the buccal film
- Swallowing of spit.
- At last, the compulsory expulsion of the dose structure.
- There are a portion of the issues that are related with current buccal medication conveyance framework.

CONCLUSION

In novel drug delivery system, mucoadhesive films/patches were developed to boost bioavailability and lower systemic toxicity. In conclusion, By increasing intrinsic or efficacy activity, it helps the target therapy. It has shown how mucoadhesive substances with quick and systemic potential work. Therefore, this strategy has become essential in the case of emergency treatment.

CONFLICT OF INTEREST

Authors declare for none conflict of interest.

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