WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 12, Issue 21, 1203-1222. Review Article ISSN 2277–7105

BUCCAL MUCOADHESIVE DRUG DELIVERY SYSTEM

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Article Received on
22 October 2023,

Revised on 12 Nov. 2023,
Accepted on 02 Dec. 2023

DOI: 10.20959/wjpr202321-30503

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ABSTRACTS

Mucoadhesive drug delivery systems are specialized formulations designed to adhere to the mucosal surfaces in the body, such as the oral cavity, nasal cavity, gastrointestinal tract, and vaginal canal. These systems aim to enhance the therapeutic efficacy of drugs by prolonging their contact time with the mucosa, improving drug absorption, and providing localized drug delivery. Mucoadhesion refers to the adhesion of a material to the mucus layer. Mucoadhesive drug delivery systems utilize various polymers and bioadhesive substances to achieve prolonged drug residence at the site of application. The key benefits include enhanced drug absorption, reduced dosing frequency, improved therapeutic efficacy, and targeted delivery to specific mucosal tissues. Buccal Mucoadhesive Drug Delivery System are specifically designed to adhere to the buccal mucosa (inner lining of the cheek) for targeted drug delivery and enhanced therapeutic efficacy. Buccal mucoadhesive drug delivery system utilize bioadhesive polymers and other excipients to prolong the contact time of drugs with the buccal mucosa. This allows for localized drug delivery, improved drug absorption, reduced dosing frequency, and avoidance of first-pass metabolism. Buccal mucoadhesive drug delivery system have diverse applications. They are used for local treatment of oral diseases like oral mucositis, periodontal diseases, and aphthous ulcers. Additionally, they are employed for systemic delivery of drugs, including peptides, hormones, analgesics, and antiemetics.

KEYWORDS: Mucoadhesive DRUG delivery system; theories of mucoadesion factor affecting buccal drug delivery system; polymers.

INTRODUCTION

Oral route has been the most important route because of its easiness of administration, low cost of therapy, patient compliance and flexibility in its formulation. But drugs that are simply absorption from gastro- intestinal tract has short half-life are quickly eliminated by the systemic circulation.[1] For systemic drug delivery, transmucosal routes—the mucosal linings of the nasal, rectal, vaginal, ocular, and oral cavities offer clear advantages over peroral administration. Three types of drug distribution are distinguished inside the oral mucosa: Drugs can be administered orally in three ways: (i) sublingually, (ii)buccally and (iii) locally.

Among the colourful routes of medicine delivery, the oral route is a seductive point for the delivery of medicines. The buccal depression was set up to be the most accessible and fluently accessible point for the delivery of remedial agents for both original and systemic delivery. Buccal tenacious medicine delivery system protracts the hearthstone time of the lozenge form at the point of operation or immersion and grease an intimate contact of the lozenge form with the immersion face and therefore contribute to bettered remedial performance of the medicine. Mucoadhesive medicine delivery systems are delivery system which employed the property of Bioadhesion an interfacial miracle in which two accoutrements.[3]

The pharmaceutical assiduity has formed considerable interest making it a major party in the healthcare assiduity. The advances and progress made by pharmaceutical assiduity have greatly contributed in terms of treatment of complaint, thereby enhancing the quality of life 1. Over the time, scientists and experimenters in the medicine development diligence are fastening on alternate routes of administration to add to the eventuality of approved medicine products, or to overcome the downsides of the oral route. Although oral route is preferred for administration of medicines, it's associated with some restrictions for illustration hepatic first pass metabolism, original GI toxin and enzymatic declination within the GI tract.[6]

Mucoadhesive drug delivery system[1,3,7,10]

The mucoadhesive system was first introduced by Park and Robinson in 1984. Mucosal adhesive enhances the effectiveness of drug delivery through long-term close contact between the drug delivery device and the absorption site. Extending the residence time of stomach by means of the mucoadhesive systems is the latest method developed 35 years ago. These may be defined as drug delivery system which utilize property of bioadhesion of certain water-soluble polymers which became adessive on hydration as hence can be used for targeting a

drug to particular region of body for extended period of time. the mucosal layer lines a number of region of body including the gastro-intestinal tract the urogenital tract, the urogenital tract, the airways the ear, nose and eye. These represents potential sites for attachment of any bioadhesive system and hence, the mucoadhesive drug delivery system includes the following;

- Buccal delivery system
- Oral delivery system
- Vaginal delivery system
- Rectal delivery system
- Nasal delivery system
- Occular delivery system

Mechanism of mucoadhesion[1,7,10,13]

The mucoadhesion can be defined as an interfacial phenomenon, where two paraphernalia are held together by interfacial attraction, one of the paraphernalia can be artificial, analogous as mucoadhesive polymer, and the other can be the mucin caste of the mucosal kerchief. The mucosal shells are covered with a mucus caste, in which mucins form the major element. Mucins are largely glycosylated glycoproteins with a large peptide backbone and oligosaccharides as side chains. Their protein backbone is characterized by the presence of repeating sequences rich in serine, threonine, and proline remainders. multitudinous of the ortho- linked oligo- saccharides side chains are constantly terminated in sialic acid, sulfonic acid, or L- fructose 7 The mucoadhesive must spread over the substrate to initiate close contact and increase face contact, promoting the diffusion of its chains within the mucus. It can be described by the two-stage mentioned below:

1. Contact stage It involves commerce between mucoadhesive material and mucous caste, the expression swells and spread over mucus membrane.
2. connection stage Mucoadhesive material is actuated by the moisture which further plasticize the system and allows the mucosal tenacious molecules to separate and connect via weak Vander walls and hydrogen bonds.20

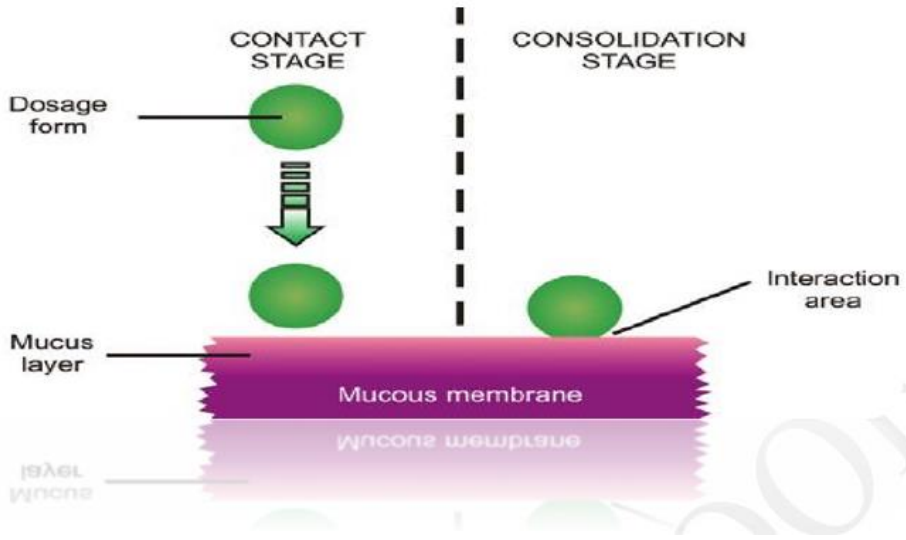


Fig 1 Steps involve in mucoadhesion.

Theories on Mucoadhesion/Bioadhesion[6,7,10,14]

Propositions on Mucoadhesion/ Bioadhesion are a complex process, and numerous propositions have been proposed to explain its mechanisms. These propositions include electronic proposition, wetting down proposition, prolixity proposition, adsorption proposition and fracture proposition Mechanisms of polymer attachment to mucosal surfaces are not yet completely understood. still, the several propositions have suggested that it may do via physical trap (prolixity proposition) and/ or chemical relations, similar as electrostatic, hydrophobic, hydrogen cling, and van der Waals relations (adsorption and electronic propositions)

Electronic theory

Electronic proposition is grounded on the premise that both mucoadhesive and natural accoutrements retain opposing electrical charges. therefore, when both accoutrements come into contact, they transfer electrons leading to the structure of a double electronic subcaste at the interface, where the seductive forces within this electronic double subcaste determines the mucoadhesive strength (Mathiowitz, Chickering, Lehr, 1999).

Wetting Theory

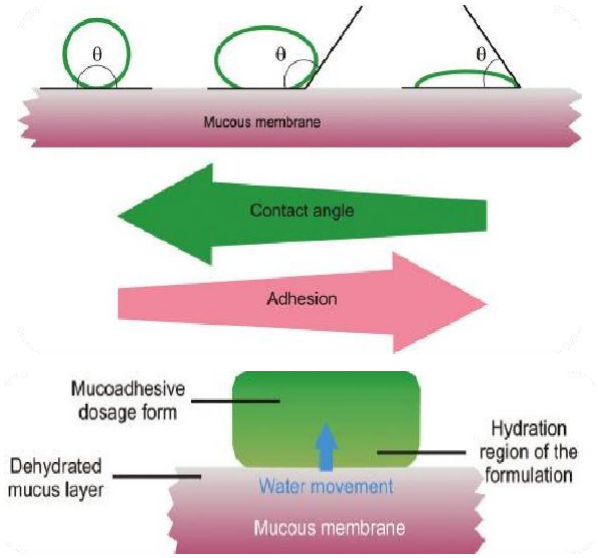
The proposition is grounded on the diffusibility medium of medicine lozenge form across the natural layers. The proposition is substantially applicable to liquid or low-density mucous membrane adhesion systems. According to this proposition, the active component bioadhesive polymer will access into irregularities on the face and form intimate contact with

the mucus and make it hard, ultimately leading to mucous membrane adhesion. The spreadability measure, SAB, can be calculated from the difference between the face powers γB and γA and the interfacial energy γAB, as indicated in equation (ϒ1) (Smart, 2005).

SAB = ϒA ϒB- ϒAB

The lesser the individual face energy of mucus and device in relation to the interfacial energy, the lesser the adhesion work, WA, i.e., the lesser the energy demanded to separate the two phases (Smart, 2005).

WA = ϒA ϒB- ϒAB



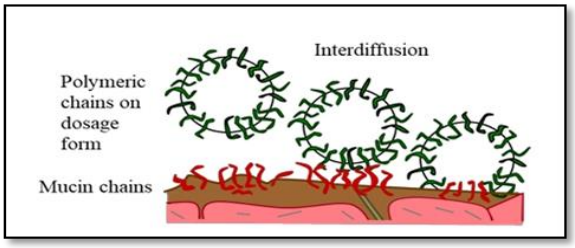
Diffusion theory

The prolixity proposition indicates that the interpenetration and trap of polymer and mucin chains are the cause of mucous membrane adhesion. The more analogous the structure of the mucoadhesive and the mucosa, the lesser the mucoadhesive force. It's believed 0.2-0.5 μm interpenetration subcaste are demanded to produce effective cling. This process is driven by the attention grade and is affected by the molecular chain length and its functionality. This proposition describes the physical trap and interpenetration of mucous membrane beaches in the pervious structure of the polymer matrix. Interpenetration is controlled by prolixity portions and contact.

time, and the contact time dependent on the molecular weight and inflexibility of the chains. The possible penetration depth (L) can be estimated by the following formula.

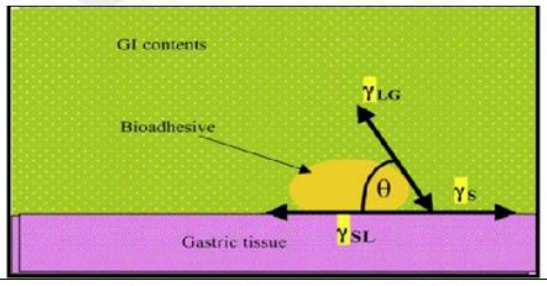
L = (tDb) ½

Where t = contact time, Db = prolixity measure of the memoir tenacious accoutrements in mucus. This is a two- way prolixity process and penetration rate depends on the effective measure of the two interacting polymers. Sufficient polymer chain inflexibility, sufficient polymers face contact exposure, analogous chemical structure and prolixity portions of bio tenacious polymers are all factors that affect the interdiffusion of macromolecule networks.



Secondary interaction between mucoadhesive device and of mucus Adsorption Theory

Adsorption Theory According to the adsorption proposition, after an original contact between two shells, the material adheres because of face forces acting between the tittles in the two shells. Two types of chemical bonds performing from these forces can be distinguished. (i) Primary chemical bonds of covalent nature, which are undesirable in mucoadhesion be get their high strength may affect in endless bonds. (ii) Secondary chemical bonds having numerous different forces of magnet including electrostatic forces, vander Waals forces, and hydrogen and hydro- phobic bonds.



The interfacial forces involved in polymer spreading, where θ is angle of contact, γ_L surface tension, γ_{SL} is solid -liquid surface tension, γ_{SG} is solid gas surface tension.

The mechanical theory

It assumes that adhesion arises from an interlocking of a liquid cement (on setting) into irregularities on a rough face. still, rough shells also give an increased face area available for commerce along with an enhanced viscoelastic and plastic dissipation of energy during common failure, which are allowed to important in the adhesion process than a mechanical effects.

Characteristics of an Ideal Buccoadhesive System[10,13]

An ideal buccal tenacious system should retain the following characteristics-

- Quick adherence to the buccal mucosa and sufficient mechanical strength.
- Medicine release in a controlled fashion.
- Facilitates the rate and extent of medicine immersion.
- Should have good case compliance.
- Shouldn't hamper normal functions similar as talking, eating and drinking.
- Should negotiate unidirectional release of medicine towards the mucosa.
- Shouldn't prop in development of secondary infections similar as dental caries.
- Retain a wide borderline of safety both locally and systemically.
- Should have good resistance to the flushing action of slaver.

ADVANTAGES[3,4,7,9]

- Bypasses gastrointestinal tract and Hepatic portal system, therefore adding the bioavailability of orally administered medicines.
- bettered patient compliance due to the elimination of associated pain with injections.
- A fairly rapid-fire onset of action can be achieved relative to the oral route, and the expression can be removed if remedy is needed to be discontinued.
- Increased ease of medicine administration.
- The buccal mucosa is well vascularized, and medicines can be quickly absorbed into the venous system underneath the oral mucosa.
- Transmucosal delivery shows smaller variables between cases, performing in lower inter subject variability as compared to transdermal patches.
- The large contact face of the oral depression contributes to rapid-fire and expansive medicine immersion.
- Medicines, which show poor bioavailability via the oral route, can be administered accessibly.

Limitations of the Mucoadhesive Buccal Drug Delivery[3,4,5,7]

System Drug administration via this route has certain limitations

- Medicine that irritates the mucosa or have a bitter or unwelcome taste or offensive odour cannot be announcement- administer.
- Medicines that are unstable at buccal pH cannot be administered.
- Only medicines with a small cure demand can be administered.

- Medicine contained in the swallowed slaver follows the peroral route and advantages of buccal route are lost.
- Only those medicines that are absorbed by unresistant prolixity can be administered.
- Eating and drinking may come defined.
- There's a possibility of the case swallowing the tablet.
- Face area available for immersion is less.
- The buccal mucosa is fairly lower passable than the small intestine, rectum, etc.
- Over hydration may lead to the conformation of slip- pery face, and the structural integrity of the expression may get disintegrated by the lump and hydration of the bioadhesive polymers.

Polymers Used for Mucoadhesive Drug Delivery[6,7,11,14,20]

These polymers are classified as-

Hydrophilic polymers

Contains carboxylic group and retain excellent mucoadhesive parcels. These are,

- PVP(Poly vinyl pyrrolidine)
- MC(Methyl cellulose)
- SCMC(Sodium carboxyl methyl cellulose)
- HPC(Hydroxyl propyl cellulose)

Hydrogels polymers

These swell when in contact with water and stick to the mucus membrane. These are further classified according to their charge;

Anionic polymers- carbopol, polyacrylates Cationic polymers-chitosan

Neural/non-ionic polymers- eudragit analogues

Anatomy and Structure of the Oral Cavity[3,7,11,14]

The oral cavity is lined by a relatively thick, dense, and multi-layered mucous membrane of a highly vas- curarized nature. The epithelium of the oral cavity is in principle similar to that of the skin, with interesting difference regarding keratinization and the protective and the lubricant mucus spread across its surface. The oral cavity can be divided into three functional zones:

- The mucus-secreting regions consisting of the soft palate, the floor of the mouth, the underside of the tongue, and the labial and buccal mucosa, which have a normally non-keratinized epithelium.

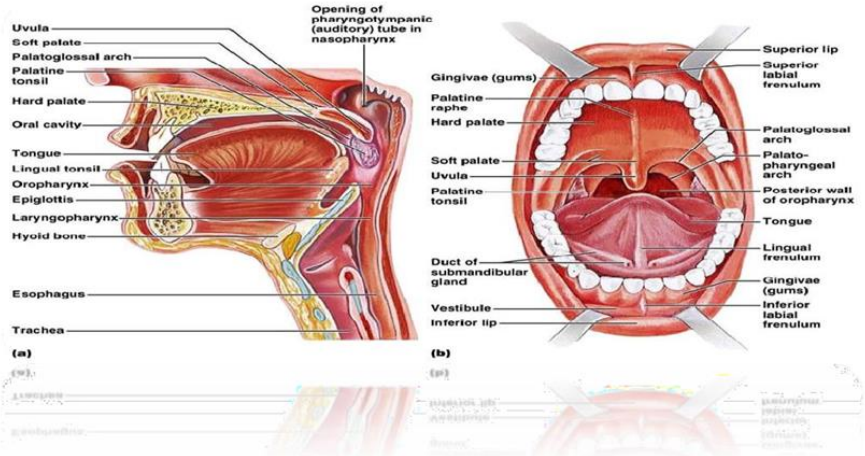
- The hard palate and the gingival are the regions of the masticatory mucosa and have a normally keratinize epidermis.
- Specialized zone consisting of the borders of the lips and the dorsal surface of the tongue with its highly selective keratinization.

Salivary glands

Three pairs of salivary glands cache up to one liter of saliva a day. Parotids lie just below and in front of observance near the jaw and cache through the parotid conduit. tubes for the submandibular and sublingual glands, when food enters the mouth that foreign glands are actuated, and slaver starts to be buried. Buccal mucosal structure and its parcels Buccal mucosa composed of several layers of different cells. The Epithelium is analogous to stratified scaled epithelia set up in rest of the at least one of which is natural nature are held together by means of interfacial forces. Technological advances in biomaterials and ways have redounded in new designs meeting the challenges of physicochemical parcels of the medicine and therefore contributing to the remedial efficacity of Buccal medicine delivery.

Mouth

The mortal mouth is lined with mucous membranes that cover the external cell subcaste of the body depression (the epithelium) from abrasive food and dangerous digestive authorities while the food passes through the upper alimentary conduit. Body and is about 50 cells layer thick. Lining epithelium of buccal mucosa is that has consistence of roughly 500 - 600 μ and face are 50 cm. Basement membrane, lamella propria followed by the submucosa is present below the epitheliallayer. Lamella propria is rich with blood vessels and capillaries that open to the internal jugular tone. Lipid analysis of buccal towel shows the presence of phospholipids 76, glycosphingolipids 23 and ceramide 0.72

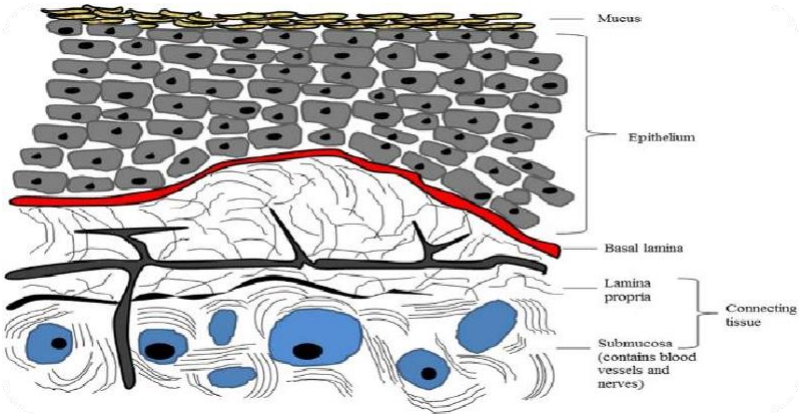


ORAL MUCOSA[11,14]

The oral mucosa has three distinctive layers videlicet the epithelium, connective towel and basement membrane.[9] The stratified scaled epithelium carpeted with mucus is set up on the remotest subcaste of oral mucosa. The consistence of epithelium is about 40- 50 cell layers thick. Structure of buccal mucosa.[11] The basement membrane, lamella propia, and submucosa lie underneath the epithelium. The mucosa of the mouth can be classified into five types grounded on the different oral depression areas.[12]

- The mouth's bottom (sublingual region)
- The mucosa of the buccal depression (cheeks)
- The goo (gingiva)
- The palatal mucosa
- The lips from the inner side.

Thenon-keratinized epithelia have further permeability than keratinized epithelia.[13] Buccal mucosa permeability is believed to be 4- 4000 times advanced than skin permeability. Oral mucosa's permeability is in order as sublingual> buccal> palatal which depends substantially on keratinization position and relative thickness.[14] The consistence of buccal mucosa is 500- 800 mm and the consistence of sublingual region i.e., the frontal lingo, the hard palate, the soft palate, and the gingivae is 100- 200mm.[15] Matched Source Similarity 17% Title: Structure of the buccal mucosa.



Advantages of the Mucoadhesive Buccal Drug Delivery System[3,4,7]

Drug administration via the oral mucosa offers several advantages:

- Ease of administration.
- Termination of remedy is easy.
- Permits localization of the medicine to the oral depression for a long time.

- Can be administered to unconscious cases.
- Excellent route for the systemic delivery of medicines with high first- pass metabolism and offers a lesser bioavailability.
- Provides significant reduction of cure and its side goods.
- Medicine that's unstable in the acidic or alkaline media or destroyed by the enzymatic terrain can be administered.
- Medicines with poor bioavailability via the oral route can be administered accessibly.
- Offers a unresistant system for medicine immersion and doesn't bear any activation.
- The presence of slaver ensures fairly large quantum of water for medicine dissolution unlike in the case of rectal and transdermal routes.

Limitations of the Mucoadhesive Buccal Drug Delivery System[3,4,7]

Drug administration via this route has certain limitations:

- Medicine that irritates the mucosa or have a bitter or unwelcome taste or offensive odor cannot be announcement- administer
- Medicines that are unstable at buccal pH cannot be administered.
- Only medicines with a small cure demand can be administered.
- Medicine contained in the swallowed slaver follows the peroral route and advantages of buccal route are lost.
- Only those medicines that are absorbed by unresistant prolixity can be administered.
- Eating and drinking may come defined.
- There's a possibility of the case swallowing the tablet.
- Face area available for immersion is less.
- The buccal mucosa is fairly lower passable than the small intestine, rectum, etc.
- Over hydration may lead to the conformation of slippery face, and the structural integrity of the expression may get disintegrated by the lump and hydration of the bioadhesive polymers.

MUCOADHESIVE POLYMERS[6,7,11,14,20]

- While developing a buccal drug delivery system, mucoadhesive plays a vital part so that there can be in increase in the duration of the capsule form's stay at the asked point. These may be water answerable and water insolvable polymers. These polymers form a close contact with mucosal face as soon as they come in contact with damp face of mucin layer.

Ideal Characteristics of Mucoadhesive Polymers[8]

- Polymer must have a high molecular weight up to100.00 or further. This is necessary to promote the cohesion between the polymer and mucus.
- Long chain polymers chain length must be long enough to promote the interpenetration and it should not be too long that diffusion becomes a problem.
- High viscosity.
- Degree of cross linking it influences chain mobility and resistance to dissolution. largely cross-linked polymers swell in presence of water and retain their structure. Swelling favours controlled release of the drug and increases the polymer/ mucus interpenetration.
- Spatial conformation.
- Strictness of polymer chain- this promotes the interpenetration of the polymer within the mucus network.
- attention of the polymer- an optimum attention is demanded to promote the mucoadhesive strength.

It depends still on the capsule form.

- Charge and degree of ionization- the effect of polymer charge on mucoadhesion was fluently shown by Bernkop Schnurch and Freudl. Cationic chitosan HCl showed pronounced cohesion when compared to the control. The attachment of EDTA an anionic group increased the mucoadhesive strength significantly. DTPA/ chitosan system displayed lower mucoadhesive strength than cationic chitosan and anionic EDTA chitosan complexes because of low charge. Hence the mucoadhesive strength can be attributed as anion> cation>non-ionic.
- Optimum hydration- devilish hydration leads to dropped mucoadhesive strength due to conformation of a slippery goo.
- Optimum pH – Mucoadhesion is optimum at low Ph conditions but at advanced pH values a change in the conformation occurs into a rod like structure making those more available for inter diffusion and interpenetration. At truly elevated pH values, positively charged polymers like chitosan form polyelectrolyte complexes with mucus and cortege strong mucoadhesive forces.
- It should non-toxic, profitable, biocompatible rather biodegradable.

Types of polymers[6]

These polymers are classified as

Hydrophilic polymers

Contains carboxylic group and retain excellent mucoadhesive parcels and these are,

- PVP (Poly vinyl pyrrolidine)
- MC (Methyl cellulose)
- SCMC (Sodium carboxyl methyl cellulose)
- HPC (Hydroxyl propyl cellulose)

Hydrogels

These swell when in contact with water and stick to the mucus membrane. These are further classified according to their charge

Anionic polymers- carbopol, polyacrylates Cationicpolymers-chitosan

Neural/non-ionic polymers- eudragit analogues

Criteria	Category	Example
Source	Natural	Chitosan, Agarose, Hyaluronic acid, Gelatin, Pectin, Tragacanth, Gums (guar, Karaya, Xanthan, etc.)
	Synthetic	Sodium Carboxy Methyl Cellulose (SCMC), methyl cellulose, Carboxy Methyl Cellulose (CMC), poly (vinyl pyrrolidone), Poly (dimethyl siloxane), Poly acrylic acid-based polymers (Polyacrylates, Carbopol, polyethylene glycol, etc.)
solubility	Water soluble	Carbopol, poly (vinyl pyrrolidone), Sodium carboxy methyl cellulose, polyacrylic acid, Pectin, xanthan gumandSodium alginate.
	Water insoluble	Chitosan, polycarbophil, ethyl cellulose
charge	Anionic	Chitosan, Sodium alginate, Carbopol, Xanthan gum, Pectin, polycarbophil.
	Cationic	Chitosan, Amino dextran, Polylysene, dimethylaminoethyl dextran
	Nonionic (neutral)	Poly vinyl alcohol, Hydroxyl propyl cellulose, Hydroxy ethyl starch, poly vinyl pyrrolidone

Buccal Mucoadhesive Lozenge

There are 3 types of bioadhesive logenges -

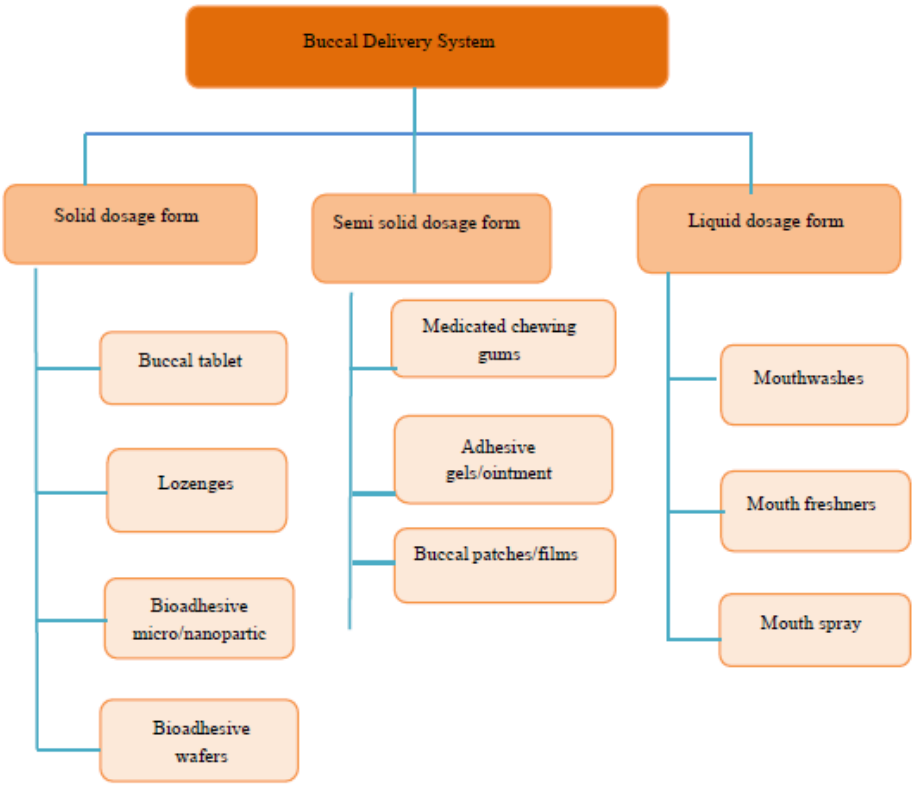
Type I- It's a single subcaste device with multidirectional medicine release. This type of lozenge form suffers from significant medicine loss due to swallowing.

Type II-In this type, an impermeable backing subcaste is superimposed on top of the medicine loaded bioadhesive subcaste, creating a double- layered device and precluding medicine loss from the top face of the lozenge form into the oral depression.

Type III- This is a unidirectional release device, from which medicine loss is minimum, since

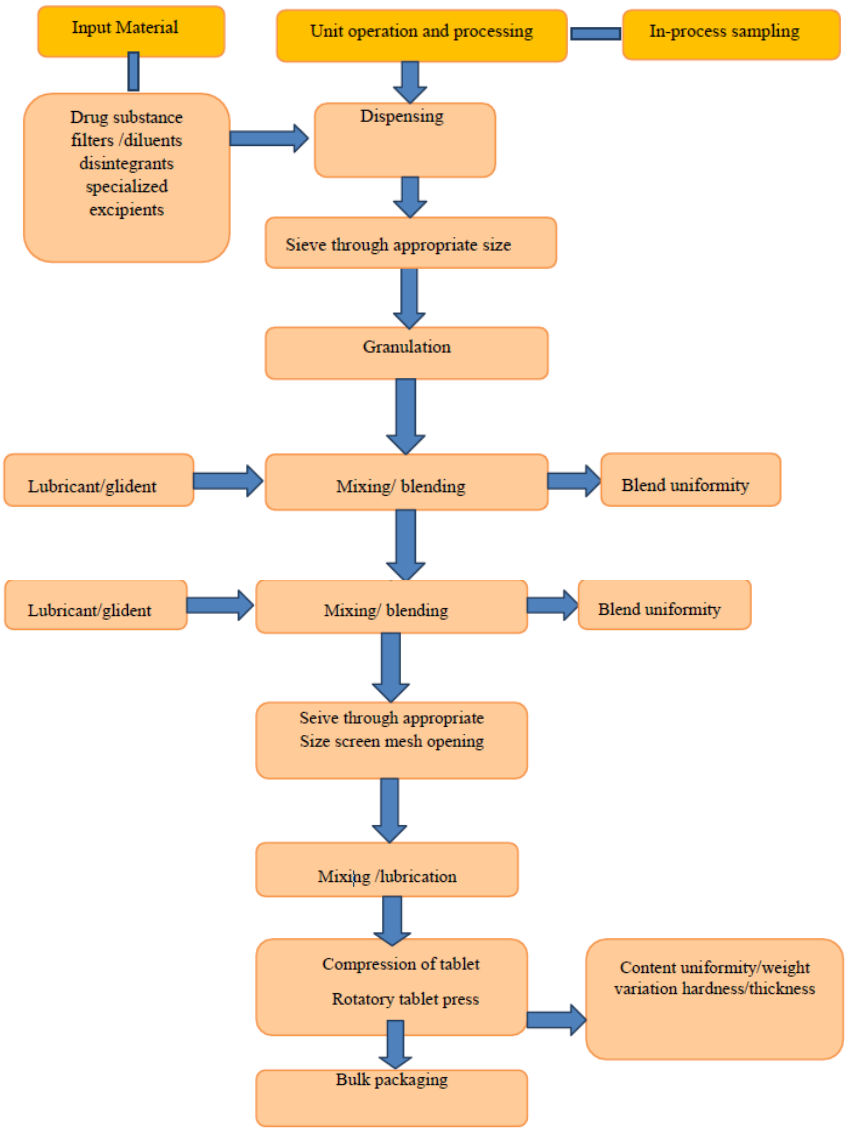
the medicine is released only from the side conterminous to the buccal mucosa. This can be achieved by sheeting every face of the lozenge form, except the bone that's in contact with the buccal mucosa.

Classification of Mucoadhesive dosage forms[13]



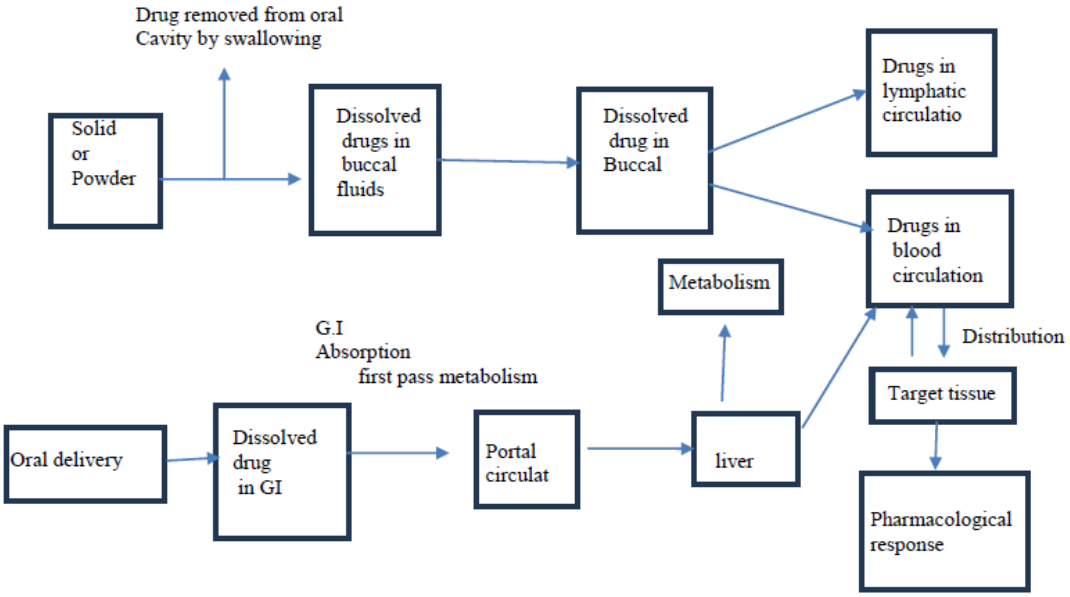
Buccal tablets[14]

Buccal tablets are intended to be held in the mouth, where they release their medicine contents for immersion directly through the oral mucosa. A buccal tablet may release medicine fleetly or may be designed to release medicine sluggishly for a prolonged effect, give bettered bioavailability of medicine due to avoidance of first- pass metabolism and also improves patient compliance by reducing repetitious cure. Unlike conventional buccal tablets, these tablets can be applied to different spots in the oral depression, including the palate, the mucosa lining the impertinence, as well as between the lip and the goo. consecutive tablets can be applied to alternate sides of the mouth. Bioadhesive tablets are generally prepared by direct co print, but wet granulation ways can also be used. Tablets intended for buccal announcement ministration by insertion into the buccal poke may dissolve or erode sluggishly; thus, they're formulated and presentation ressed with sufficient pressure only to give a hard tablet.



Buccal flicks/films[14]

flicks are the most lately developed lozenge form for buccal administration. Buccal flicks may be preferred over tenacious tablets in terms of inflexibility and comfort. Bioadhesive flicks are analogous to laminated patches in terms of their flexibility and manufacturing process. They're generally manufactured by a solvent casting system. The medicine and polymer are first dissolved in a casting detergent or solvent admixture. The result is also cast into flicks, dried and eventually laminated with a backing subcaste or a release liner. The backing subcaste helps to slacken the prolixity of slaver into the medicine subcaste, therefore enhancing the adhesion time and reducing medicine loss into the oral depression. The solvent casting system is simp le, but suffers from some disadvantages, including long processing time, h igh cost and environmental enterprises due to the detergents used. These downsides can be overcome by the hotmelt extrusion method.

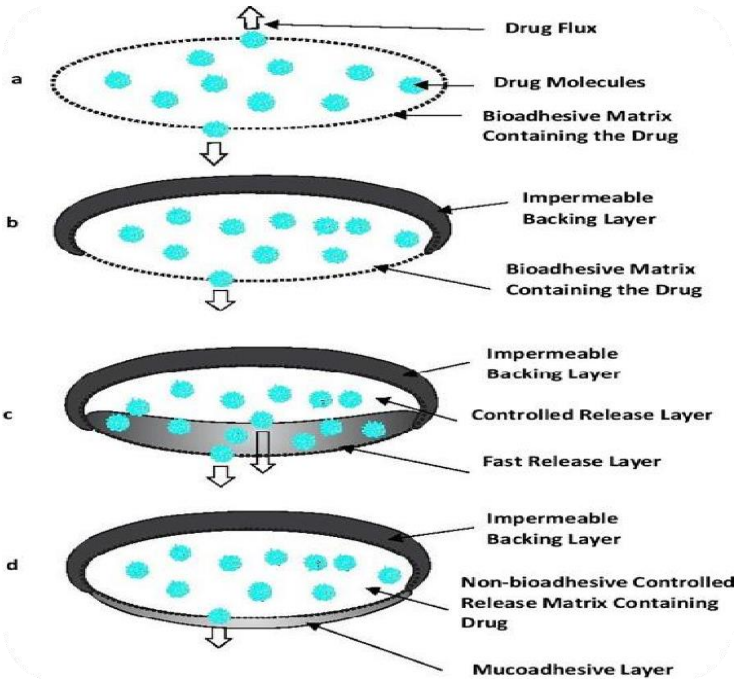


Buccal gels and ointments[14,15]

Semisolid lozenge forms, similar as gels and ointments have the advantage of easy dissipation throughout the oral mucosa. medicine dosing from circumfluous lozenge forms may not be as accurate as from tablets, patches or flicks. Poor retention of the gels at the point of operation has been overcome by using bioadhesive phrasings. Certain bioadhesive polymers, e.g. HPMC, poloxamer 407, sodium carboxymethylcellulose, Carbopol, hyaluronic acid and xanthan goo suffer a phase change from a liquid to a semisolid. This change enhances the density, which results in sustained and controlled release of medicines. A largely thick gel was developed from Carbopol and hydroxyl propyl cellulose for ointment lozenge forms that could be maintained on the towel for over to 8 h.

Buccal patches[14,15]

Patches are laminates conforming of an impermeable backing subcaste, the medicine containing force subcaste from which the medicine is released in a controlled manner and abioadhesive face for mucosal attachment. Buccal patch systems are analogous to those used in transdermal medicine delivery. Two styles used to prepare tenacious patches include solvent casting and direct milling. In the solvent casting system, the intermediate distance from which patches are punched is prepared by casting the result of the medicine and polymer (s) onto a backing subcaste distance and latterly allowing the detergent (s) to dematerialize. In the direct milling system, formulation ingredients are homogeneously mixed and compressed to the asked consistence and patches of destined size and shape are also cut or punched out.



Buccal Bioadhesive Maquillages[13]

Buccal bioadhesive greasepaint lozenge forms are an admixture of bioadhesive polymers and medicine and the reduction of diastolic B.P after administration of buccal tablet and buccal film of Nifedipine is scattered onto the buccal mucosa.

Some examples of drug products[11]

PRODUCT NAME	DRUGS	DOSAGE FORM	MANUFACTURER
Buccastem	Prochlorperazine	Tablet	Reckitt Benckiser
Suscard	Glyceryltrinitrate	Tablet	Forest laboratories
Aphtach	Triamcinolone acetonide	Tablet	Teijin Ltd
Straint SR	Testosterone	Tablet	Ardana Bioscience Ltd
Zolpimist	Zolpidem	Spray	Nova Del Pharmaceuticals
Coralan	Hydrocortisone sodium succinate	Pellets	CelltechPharma Ltd
Corsodyl	Chlorhexidine Hydrocortisone sodium succinate	Gel	GlaxoSmithKline
Subutex	Buprenorphine HCl	Tablet	Reckitt Benckiser
Actiq	Fentanyl citrate	Lozenge	Cephalon
Nicorette	Nicotine	Chewing gum	GSK Consumer Health
Nitrostat	Nitroglycerine	Tablet, Spray	Pfizer Pharmaceuticals
Suboxone	Buprenorphine hydrochloride-naloxone HCl	Tablet	Reckitt Benckiser
Sativex	Cannabis-derived	Spray	GW Pharmaceuticals, PLC

RECENT ADVANCES IN MUCOADHESIVE DRUG DELIVERY SYSTEM[14]

Mucoadhesive Polymers

Different classes of polymers have been delved for implicit use as mucoadhesive. PAA is act as a good mucoadhesive. PAA is copolymerised with polyethylene glycol (PEG) or poly (vinyl pyrrolidone) (PVP) to ameliorate these parcels.

Devices

Several laminated bias have been developed to achieve sustained medicine release.

It can be classified as-

• Monolithic (or matrix) systems where the medicine is dissolved or dispersed in the polymer system – prolixity of medicine from the medicine/ polymer matrix controls the overall rate of its release from the device.

• Reservoir (or membrane) systems where diffusional resistance across a polymeric membrane controls the overall medicine release rate.

CONCLUSION

Drug delivery systems are specialized formulations designed to adhere to the mucosal surfaces in the body, such as the oral, nasal, gastrointestinal, and vaginal mucosa. These systems offer several advantages in terms of enhanced drug absorption, prolonged drug residence time, targeted delivery, and improved therapeutic efficacy. They utilize mucoadhesive polymers and other excipients to achieve adhesion to the mucosal surfaces, allowing for controlled release and localized drug delivery. Mucoadhesive drug delivery systems have a wide range of applications, including the treatment of oral diseases, nasal disorders, gastrointestinal conditions, and vaginal infections. They have the potential to improve patient compliance, reduce dosing frequency, and provide targeted therapy. However, the selection of appropriate mucoadhesive polymers, understanding the mechanisms of mucoadhesion, and addressing the challenges associated with formulation stability and mechanical disruption are critical for the successful development and application of mucoadhesive drug delivery systems. Overall, these systems hold great promise in the field of pharmaceutical research and can significantly impact the effectiveness of drug therapies. Buccal mucoadhesive drug delivery systems provide a promising approach for targeted and enhanced drug delivery through the buccal mucosa. They offer advantages in terms of localized therapy, improved bioavailability, and reduced dosing frequency, making them a valuable option in the field of pharmaceutical research and development.

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