INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Research Article

A Comprehensive Review on Mucoadhesive Buccal Film:Polymer Selection and Evaluation Techniques

Adhikari Ishwari L.*, Jadhav Mohit M., Araj Ranee D., Adhikari Samidha S., Padwal Krutika B.

Department of Pharmaceutics, Siddhi's Institute of Pharmacy, Nandgaon Murbad Thane 421401 (Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere Raigad).

ARTICLE INFO

Published: 16 Nov 2026
Keywords:
mucoadhesive buccal film, polymer selection, thiomers, mucoadhesion testing, transmucosal delivery
DOI:
10.5281/zenodo.24271253

ABSTRACT

Mucoadhesive buccal films are an alternative to taking medicine by mouth. They avoid the breakdown by enzymes and the pass metabolism that happens in the liver. They also help patients who have trouble swallowing. Almost none of these products are sold. This review explains why: it looks at how to choose polymers that stay stuck in a wet moving mouth and at the lack of realistic test methods. It covers how the inside of the cheek works and how mucoadhesion works. It compares polymer groups – cellulose derivatives, polyacrylates, natural polysaccharides, synthetic film formers and thiomers. It also shows how to make and test the films. Because no single polymer is perfect many films use blends. Adhesive polymers such as Carbopol and Na-CMC swell a lot and make the films weaker. Polymers like HPMC, PVA and PEO give the film structure. Are not as sticky. Thiomers make the film stick better and let medicine pass through easily but they add cost and can hurt stability. The main gaps are that test methods are not consistent and that lab tests do not match life. The review calls for adhesion testing models that mimic saliva flow and more studies, in humans. It also points out promise in 3D printing, films that carry nanoparticles and vaccines that use the mouth lining.

INTRODUCTION

Although oral administration is the most common route for drug administration, it presents problems of drug degradation due to enzymes and acidic environment, as well as extensive first pass metabolism in liver, while being inappropriate for dysphagic patients [1,8]. As an alternative to the limitations of oral administration, transmucosal delivery through oral cavity represents a solution. The buccal epithelium provides a relatively permeable and strong (non-keratinized) tissue, with

***Corresponding Author:** Adhikari Ishwari L
Address: Department of Pharmaceutics, Siddhi's Institute of Pharmacy, Nandgaon Murbad Thane 421401 (Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere Raigad).
Email ✉: ishwaria462@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

blood supply directly draining to jugular vein, being an interesting site for systemic drug delivery [17,18]. The buccal mucosa is less permeable than sublingual but provides larger surface area with less movements, being more suitable for sustained, retentive dosage forms [18,20]. Many patients prefer mucoadhesive film as a buccal dosage form due to its smaller size, flexibility and lower thickness in comparison with tablets and lozenges [4,13]. Such film can be developed for local or systemic action and is being investigated for small molecules, peptides, vaccines and nanoparticles [4,6,12]. Moreover, it is increasingly of interest for geriatric/ dysphagic patients, to reduce pill burden

and simplify the administration [3]. However, market translation is still scarce. There is no authorised mucoadhesive buccal film available in the UK, and very few in the USA [1,8].

The two main scientific concerns of this lack of market translation are the choice of polymers that provide adequate and sustained adhesion in a wet and dynamic environment (oral cavity) [25,28,33], and the lack of standardised and physiologically relevant methods of evaluation [1,11,15].

This review discusses both issues. It provides a summary of buccal physiology and mucoadhesive mechanisms (Section 2), comparison of the main groups of polymers (Section 3), a brief overview of manufacturing (Section 4), characterisation techniques (Section 5) and discussion of challenges and new approaches (section 6)

METHODOLOGY

A literature search was conducted using databases such as PubMed, Google Scholar, ScienceDirect, and Scopus.

Keywords including “mucoadhesive buccal film,” “mucoadhesive polymers,” “polymer selection,” and “evaluation techniques” were used. Relevant research articles and review papers focusing on polymer selection, formulation, and evaluation of mucoadhesive buccal films were reviewed and analyzed.

Buccal mucosa and mucoadhesion mechanisms

2.1 Anatomical and physiological considerations

I have studied the mucosa and found it is made up of a non-keratinised stratified squamous epithelium, a basement membrane and a vascular lamina propria or submucosa (Figure 1) [17,18].

The buccal mucosa provides a barrier that's different from the skin. The intercellular lipids inside the mucosa’s epithelium are chemically and structurally different from the lipids, in the skin’s stratum corneum. Because of this the way penetration enhancers work in skin cannot be used away for the buccal mucosa [19].

Saliva, mucus turnover, chewing, speaking and swallowing all keep working on the mucosa. They make it hard to keep medicines in place and make local therapy more difficult [33]. Age also changes the mucosa’s properties and the makeup of saliva which matters especially for older patients [3].

The mucosa’s epithelium usually limits permeation. That is why permeation enhancers are often added to films that aim to deliver drugs [3,5,19].

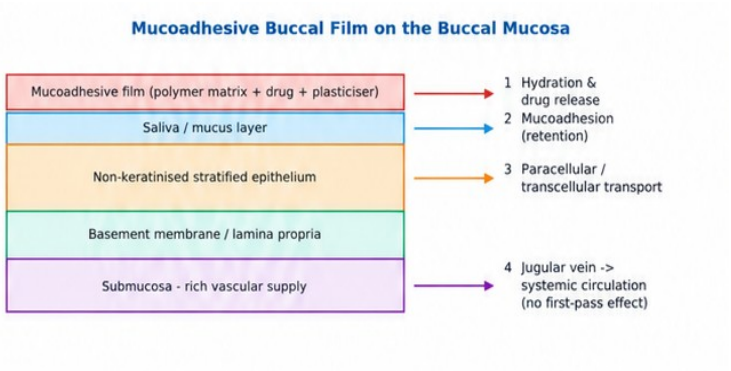


Figure 1: Schematic Cross-Section of a Mucoadhesive Buccal Film in Contact with the Buccal Mucosa, Indicating the Main Events Fromhydration to Systemic Absorption (Original Illustration Based On [1,17,18]).

2.2 Mechanism and theories of mucoadhesion

Mucoadhesion is usually described as a two-stage process. The first stage is contact or wetting. The second stage is consolidation where adhesive interactions are formed [28]. A three-stage description is also used. The first stage is. Swelling of the polymer. The second stage is interpenetration of polymer and mucin chains. The third stage is formation of bonds between entangled chains (Figure 2) [25]. Several theories (wetting, electronic, adsorption, diffusion and fracture) explain aspects of this process. The use of these theories together is helpful, in understanding the behavior of a given system [16,25].

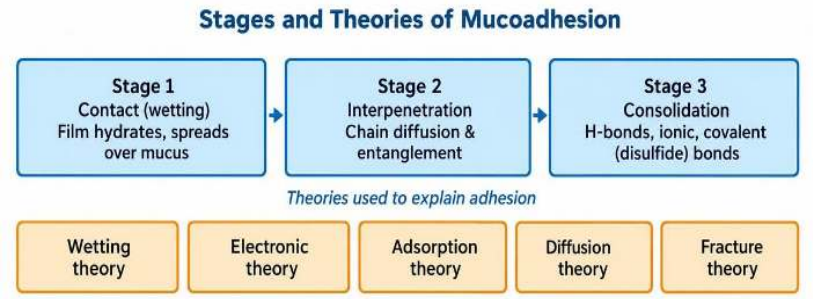


Figure 2: Stages of Mucoadhesion and the Principal Theories Used to Explain Adhesion (Original Illustration Based On [16,25,28]).

Mucoadhesive materials are typically water-loving molecules that have many groups that can make hydrogen bonds. Carbomers and chitosans are examples [28]. Adhesion depends on factors. These include the polymers weight, chain length and how much cross-linking it has. Hydration plays a role too. So do functional groups, charge and concentration. Contact time matters, as does the rate at which mucin turns over and how thick the mucus is [25]. Hydration is tricky. It helps polymer chains move freely which can improve adhesion.. If theres too much water the adhesive bond becomes weaker. Much hydration can lead to loss of retention [24,28].

3. Polymer Selection for Buccal Films

3.1 Selection criteria

More than thirty mucoadhesive polymers have been used in film formulations [1]. An ideal polymer should (i) form an uniform film, (ii) stick strongly but not cause irritation to the mucosa (iii) get wet in a controlled way when in saliva, (iv) work well, with the drug and the plasticiser and (v) not be harmful and work well with the body [1,2,9]. (Figure 3 ,Table 1)

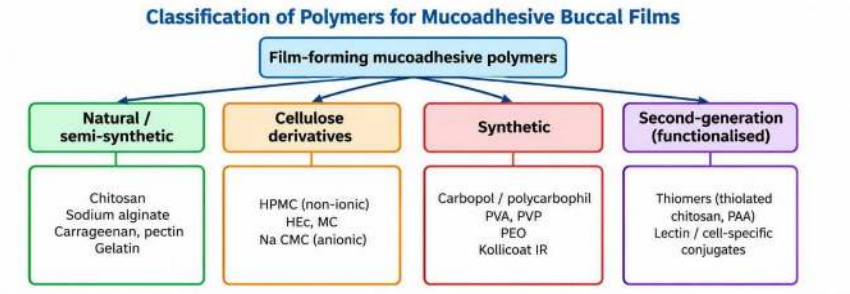


Figure 3: Classification of Polymers Commonly Used for Mucoadhesive Buccal Films, Including Second-Generation Thiolated Polymers

(original illustration based on [1,2,9,25,29]).

3.2 Cellulose derivatives

Cellulose ethers are widely used as film formers because they form films well stick to membranes and are safe for use in the body. Different types and thickness levels of cellulose ethers can be chosen to control how quickly a drug is released. Viscosity or water-repelling grades can also act as protective layers that prevent the film from being washed away by saliva [9]. When comparing sodium carboxymethylcellulose (SCMC) and hydroxypropyl methylcellulose (HPMC) films that contain Carbopol 934P SCMC films showed attachment to mucous surfaces in lab tests.. Hpmc films were stronger more flexible and swelled in a better way when exposed to simulated saliva. They also stuck better in real-life tests with volunteers. Increasing the amount of Carbopol made the films more elastic and more adhesive. It weakened the film and reduced how much water it could absorb [27]. Because of these qualities HPMC is often used as a base polymer, in films usually mixed with an adhesive polymer to improve performance.[9,23,27]

3.3 Polyacrylates

Carbopol and polycarbophil are polyacrylates that have a strong ability to form hydrogen bonds. When HPMC is combined with polycarbophil to make films these blended films show a work of adhesion and a greater maximum detachment force compared to pure HPMC films. This improvement is due to hydrogen bonding between the two polymers, which has been confirmed by FTIR and XRD analysis [23].

However films made from Carbopol can swell much. In one study the surface area of Carbopol films increased significantly when exposed to saliva. This excessive swelling was seen as a drawback, for retention meaning the films did not stay in place well on the inside of the mouth. In contrast sodium alginate films performed better in terms of bioadhesion tensile strength and elasticity [24].

3.4Chitosan, alginate and other natural polymers

Marine polysaccharides such as chitosan, alginate and carrageenan are attractive because of the biocompatibility, biodegradability, high water absorption and abundant functional groups of polysaccharides. Chitosan is cationic. Interacts electrostatically with negatively charged mucin. Alginate and carrageenan rely on groups and hydrogen bonding [2]. Alginate films released a model drug, sumatriptan by diffusion, than disintegration [24]. Natural polymer films often require plasticisers. Blending to achieve adequate flexibility. [2,24]

3.5 Synthetic film formers and plasticisers

Polyvinyl alcohol (PVA) polyvinylpyrrolidone (PVA) oxide) (PEO) and Kollicoat IR are used mainly to give the ability to form a film and to adjust how fast it breaks down and how quickly the drug is released. A rizatriptan film made with HPMC K4M, PVA, PEO, glycerol and stevia had ex mucoadhesion strengths between 0.205 and 0.790 N. The drug release was between 98 and 102% between 40 and 80 minutes, depending on the mix. The plasticiser and polymer concentrations had an effect on release, mechanical and mucoadhesive properties [22]. A film made with Kollicoat IR, PEO and HPMC that included Aloe vera gel powder as a way to make the drug go through the mouth lining transported 73.2% of propranolol HCl and 96.1% of rizatriptan benzoate through rat mouth tissue within

100 minutes. There was no damage, to the tissue [21]. Plasticisers like glycerol, propylene glycol and PEG are important to stop the film from breaking.. When they are too much they make the film weaker [5,22,24].

3.6 Thiolated polymers (thiomers) and second-generation systems

Mucoadhesive polymers are usually grouped into two types: -specific first-generation polymers and second-generation polymers that are made to interact in specific ways [25]. Thiomers are made by attaching groups directly to polymers like polyacrylates or chitosan. These thiol groups can form disulfide bonds with cysteine- mucus glycoproteins. That's why thiomers stick better to mucus. They also help with drug absorption slow down enzyme breakdown and block efflux pumps that push drugs out of cells [29,31].

Preactivated thiomers are the step, in this design. They are more reactive and less likely to break down from oxidation making them more stable [30]. Thiolation has also been used on nanoparticles. These nanoparticles can be added to films to help them stay in place longer and be taken up better by the body [10,34].

Table 1: Comparative Features of Principal Polymers Used in Mucoadhesive Buccal Films

Polymer	Nature	Key Properties Reported	Limitation
HPMC	Non-ionic cellulose ether	Good film former; tough, elastic films; tolerable swelling; good in vivo bioadhesion	Moderate intrinsic adhesion; usually blended [9,27]
Na-CMC	Anionic cellulose ether	High in vitro bioadhesion; extensive swelling in water	Weaker, less elastic films than HPMC[27]
Carbopol / polycarbophil	Anionic polyacrylate	Raises bioadhesive strength and elasticity; blends increase work of adhesion	Can over-swell; lowers film strength [23,24,27]
Chitosan	Cationic polysaccharide	Strong electrostatic mucoadhesion; biocompatible, biodegradable	Needs acidic casting medium and plasticiser [2]
Sodium alginate	Anionic polysaccharide	Higher bioadhesion, tensile strength and elasticity than Carbopol films; diffusion-controlled release	Hydration behaviour must be controlled [2,24]
PVA / PVP / PEO / Kollicoat IR	Synthetic, mostly non-ionic	Film-forming; tune disintegration and release	Low intrinsic adhesion; combined with HPMC or Carbopol [21,22]
Thiomers	Thiolated chitosan, polyacrylates	Improved mucoadhesion; permeation enhancement; enzyme/efflux inhibition	Synthesis cost; oxidation (addressed by preactivation) [29-31]

4. Manufacturing Considerations

Solvent casting is still the method and lets aqueous or organic solutions be poured and dried into even films [4,13]. Hot-melt extrusion does not use solvents. Has been looked at as another way while inkjet and 3D printing electrospraying and electrospinning are newer ways that provide more choices, in dose and personalized treatment but bring new needs for film quality that are not yet clear [1,3,5,6,13]. The way something is made affects the thickness of the film, leftover solvents how the drug spreads out and how it behaves physically. This should be shared together with test results.[4,15]

5. Evaluation Techniques

Evaluating films involves checking their physical properties how well they stick to mucous membranes how the drug is released how it passes through tissues and how they perform in living systems [15]. Since there are no FDA guidelines or USP standards, for oral films labs often use different testing setups. This makes it hard to compare results across studies (Figure 4 Table 2) [11,15].

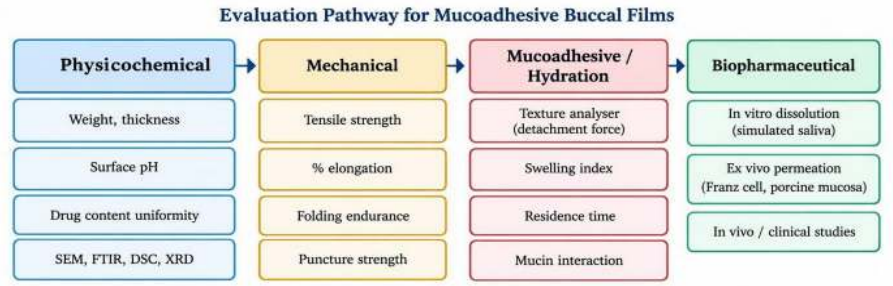


Figure 4: Evaluation Pathway for Mucoadhesive Buccal Films, from Physicochemical Screening to Biopharmaceutical and in Vivo

testing (original illustration based on [1,11,15]).

5.1 Physicochemical and mechanical characterisation

Standard tests include weight uniformity, thickness uniformity, surface pH (to predict irritation) drug content uniformity folding endurance and moisture uptake. The morphology, drug-polymer interactions and crystallinity are studied using SEM, FTIR, DSC and XRD [21–23]. Mechanical properties such, as tensile strength, percentage elongation and puncture strength are measured using an analyser or tensile tester. These tests must confirm that the film can endure handling and oral movements without cracking [11,23,27].

5.2 Mucoadhesion and hydration

The common way to test this in a lab is by using a texture analyser to measure how much force it takes to pull a film away from mucosa that has been taken from an animal or from a mucin disc [11,24,27]. The results vary depending on the type of substrate how much force is used how long the film is in contact the liquid used to keep things wet and how fast the test is done. This is why it is hard to compare results from studies [11,16]. At the time the swelling index in simulated saliva is also measured because too much water can make the film less sticky [24,28]. Testing in people gives the best idea of how long the film will stay in the mouth.. Even then there is only a link between lab and real results when looking at the same type of polymer, not different ones [27]. Better lab tests that copy conditions in the mouth, like the flow of saliva and the mucus are needed to make lab results match what happens in real life [1].

5.3 Drug release and ex vivo permeation

Release is usually tested in simulated saliva or buffer using paddle, flow-through or modified diffusion setups, with disintegration or dissolution times noted for dissolving designs [15,22]. Ex vivo permeation uses Franz diffusion cells with removed mucosa from pig, rat or goat and reports flux and permeability coefficient;for example methimazole moved through pig mucosa with a steady-state flux of 0.068 mg cm ^{2} h ^{1} and a permeability coefficient of 0.065 cm h ^{1} [26] while histopathology of the tissue after exposure checks, for mucosal damage [21]. Newer analytical tools are being used to evaluate permeation of both molecules and biologics [5].

Table 2: Summary of Evaluation Parameters for Mucoadhesive Buccal Films

Parameter	Method / instrument	Information obtained	Remark
Thickness, weight, content uniformity	Micrometer, balance, HPLC/UV	Dose reproducibility	Compendial limits [15,21]
Surface pH	pH electrode on hydrated film	Irritation potential	Aim near salivary pH [15]
Tensile / puncture strength, % elongation	Texture analyser, tensile tester	Strength, flexibility	Handling and wear [11,23,27]
Folding endurance	Repeated folding	Flexibility	Quick screening[21]
Swelling index	Gravimetric in simulated saliva	Hydration, retention	Over-swelling harmful [24,27]

Parameter	Method / instrument	Information obtained	Remark
Mucoadhesion	Texture analyser; mucosa or mucin	Detachment force, work of adhesion	Not standardised[11,16,24]
Residence time	Human volunteers	In vivo retention	Best relevance[27]
Release / dissolution	Simulated saliva, modified set-ups	Release profile	Physiological relevance[1,15,22]
Ex vivo permeation	Franz cell, porcine/rat/goat mucosa	Flux, Kp, lag time	Species variation[21,22,26]
Solid-state / morphology	SEM, FTIR, DSC, XRD	Compatibility, crystallinity	Supportive[21-23]

DISCUSSION

Polymer selection. The information available shows that choosing a polymer involves a balance. Sticky negative charged polymers like Carbopol and SCMC make things stick better but they get bigger and make the films weaker whereas HPMC, PVA and PEO give strong structure but don't stick as well [23,24,27]. Mixing is therefore the usual approach and special experiments (like composite and mixture designs) have been used to find the best mixtures [21,23]. Thiomers offer an improvement in sticking and getting through and are moving closer, to real products although their price and the way they work make things more complicated [29–31].

Evaluation gaps.

The biggest problem is that methods used in studies are not the same. There are differences in what kind of mucosal material's used what liquid is used to keep it wet how the materials touch each other and the equipment used. Because of these differences it’s hard to compare results across studies [11,15]. Also not many studies check if how well something sticks in a lab test matches how long it stays in the body [27]. Changes in saliva and mucosal tissue that happen as people age are not often included in models. The effects of things like eating, drinking and talking are also rarely taken into account [3,33]. What needs to be done is: (i) create standard, agreed-upon ways to test texture and how well things stick to mucosa, (ii) develop artificial saliva and flow systems that act more like real human conditions [1] and (iii) do more studies in people to see how long lead formulations stay in place and how they move through the body. [1,15,27]

Emerging strategies. New printing methods allow for dosing and custom-made films [3,13]. Combining nanoparticles with films can help things stick longer. Let more medicine pass through [10]. Delivering vaccines through mucosal surfaces is becoming an area of interest [12]. For drugs results, in patients have been limited because absorption is inconsistent and not enough peptide medicine can be loaded. This means future work should focus on more stable medicine amounts and adding things that help the medicine pass through better [6,7].

CONCLUSION

Mucoadhesive buccal films are an user-friendly option for drug delivery. They work well when people need a non-invasive way to take medicine.. Getting them right is not easy. The key is choosing the polymers and testing them thoroughly.

HPMC-based blends, with polyacrylates, chitosan or alginate are still the common and practical choices. They stick well to the mouth lining. Release the drug steadily. Thiomers are an option and show real potential. They can bind better to mucosal surfaces, which might improve how well the drug works.

To turn lab ideas into products we need better testing. Methods should mimic what happens in the body. We also need well-planned in studies. These help us know if the films will work in people. Without this even a good lab formula won’t become a approved medicine.

REFERENCES

1. Shipp L, Liu F, Kerai-Varsani L, Okwuosa TC. Buccal films: a review of therapeutic opportunities, formulations & relevant evaluation approaches. J Control Release. 2022;352:1071-1092. doi:10.1016/j.jconrel.2022.10.058.
2. 2.Yermak IM, Davydova VN, Volod'ko AV. Mucoadhesive marine polysaccharides. Mar Drugs. 2022;20 (8):522. doi:10.3390/md20080522

3. 3.Southward J, Liu F, Aspinall SR, Okwuosa TC. Exploring the potential of mucoadhesive buccal films in geriatric medicine. Drug Dev Ind Pharm. 2025:1-21. doi:10.1080/03639045.2025.2467329
4. 4.Morales JO, McConville JT. Manufacture and characterization of mucoadhesive buccal films. Eur J Pharm Biopharm. 2011;77 (2):187-99. doi:10.1016/j.ejpb.2010.11.023
5. 5.Nair VV, Cabrera P, Ramírez-Lecaros C, Jara MO, Brayden DJ, Morales JO. Buccal delivery of small molecules and biologics: of mucoadhesive polymers, films, and nanoparticles – an update. Int J Pharm. 2023;636:122789. doi:10.1016/j.ijpharm.2023.122789
6. 6.Montenegro-Nicolini M, Morales JO. Overview and future potential of buccal mucoadhesive films as drug delivery systems for biologics. AAPS PharmSciTech. 2017;18 (1):3-14. doi:10.1208/s12249-016-0525-z
7. 7.Morales Montecinos J, Brayden DJ. Buccal delivery of small molecules and biologics: of mucoadhesive polymers, films, and nanoparticles. Curr Opin Pharmacol. 2017;36:22-8. doi:10.1016/j.coph.2017.07.011
8. 8.Silva BM, Borges AF, Silva C, Coelho JF, Simões S. Mucoadhesive oral films: the potential for unmet needs. Int J Pharm. 2015;494 (1):537-51. doi:10.1016/j.ijpharm.2015.08.038
9. 9.Cheng H, Wang Y, Hong Y, Wu F, Shen L, Lin X. Characteristics, preparation and applicability in oral delivery systems of cellulose ether-based buccal films. Drug Deliv. 2025;32 (1):2525223. doi:10.1080/10717544.2025.2525223
10. 10.Desai DD, Manikkath J, Lad H, Kulkarni M, Manikkath A, Radhakrishnan R. Nanotechnology-based mucoadhesive and mucus-penetrating drug-delivery systems for transbuccal drug delivery. Nanomedicine (Lond). 2023;18 (21):1495-514. doi:10.2217/nnm-2023-0180
11. 11.Alaei S, Omidian H. Mucoadhesion and mechanical assessment of oral films. Eur J Pharm Sci. 2021;159:105727. doi:10.1016/j.ejps.2021.105727
12. 12.Mokabari K, Iriti M, Varoni EM. Mucoadhesive vaccine delivery systems for the oral mucosa. J Dent Res. 2023;102 (7):709-18. doi:10.1177/00220345231164111
13. 13.Tian Y, Orlu M, Woerdenbag HJ, Scarpa M, Kiefer O, Kottke D, et al. Oromucosal films: from patient centricity to production by printing techniques. Expert Opin Drug Deliv. 2019;16 (9):981-93. doi:10.1080/17425247.2019.1652595
14. 14.de Carvalho ACW, Paiva NF, Demonari IK, Duarte MPF, do Couto RO, de Freitas O, et al. The potential of films as transmucosal drug delivery systems. Pharmaceutics. 2023;15 (11):2583. doi:10.3390/pharmaceutics15112583
15. 15.Nair AB, Kumria R, Harsha S, Attimarad M, Al-Dhubiab BE, Alhaider IA. In vitro techniques to evaluate buccal films. J Control Release. 2013;166 (1):10-21. doi:10.1016/j.jconrel.2012.11.019
16. 16.Kulkarni R, Fanse S, Burgess DJ. Mucoadhesive drug delivery systems: a promising non-invasive approach to bioavailability enhancement. Part I: biophysical considerations. Expert Opin Drug Deliv. 2023;20 (3):395-412. doi:10.1080/17425247.2023.2181331
17. 17.Campisi G, Paderni C, Saccone R, Di Fede O, Wolff A, Giannola LI. Human buccal mucosa as an innovative site of drug delivery. Curr Pharm Des. 2010;16 (6):641-52. doi:10.2174/138161210790883778
18. 18.Pather SI, Rathbone MJ, Şenel S. Current status and the future of buccal drug delivery systems. Expert Opin Drug Deliv. 2008;5 (5):531-42. doi:10.1517/17425247.5.5.531
19. 19.Nicolazzo JA, Reed BL, Finnin BC. Buccal penetration enhancers—how do they really work? J Control Release. 2005;105 (1-2):1-15. doi:10.1016/j.jconrel.2005.01.024
20. 20.Goswami T, Jasti BR, Li X. Sublingual drug delivery. Crit Rev Ther Drug Carrier Syst. 2008;25 (5).
21. 21.Salehi S, Boddohi S. Design and optimization of Kollicoat IR based mucoadhesive buccal film for co-delivery of rizatriptan benzoate and

propranolol hydrochloride. Mater Sci Eng C Mater Biol Appl. 2019;97:230-44. doi:10.1016/j.msec.2018.12.036

22. 22.Salehi S, Boddohi S. New formulation and approach for mucoadhesive buccal film of riza-triptan benzoate. Prog Biomater. 2017;6 (4):175-87. doi:10.1007/s40204-017-0077-7
23. 23.Kraisit P, Limmatvapirat S, Nunthanid J, Sri-amornsak P, Luangtana-Anan M. Preparation and characterization of hydroxypropyl methylcellu-lose/polycarbophil mucoadhesive blend films using a mixture design approach. Chem Pharm Bull (Tokyo). 2017;65 (3):284-94. doi:10.1248/cpb.c16-00849
24. 24.Skulason S, Asgeirsdottir MS, Magnusson JP, Kristmundsdottir T. Evaluation of polymeric films for buccal drug delivery. Pharmazie. 2009;64 (3):197-201. doi:10.1691/ph.2009.8188
25. 25.Agarwal S, Aggarwal S. Mucoadhesive poly-meric platform for drug delivery; a comprehensive review. Curr Drug Deliv. 2015;12 (2):139-56. doi:10.2174/1567201811666140924124722
26 .De Caro V, Giandalia G, Siragusa MG, Gian-nola LI. Buccal delivery of methimazole as an alternative means for improvement of drug bioavailability: permeation studies and matrix system design. Curr Pharm Des. 2012;18 (34):5405-10. doi:10.2174/138161212803307563
26. Peh KK, Wong CF. Polymeric films as vehicle for buccal delivery: swelling, mechanical, and bioad-hesive properties. J Pharm Pharm Sci. 1999;2 (2):53-61.
27. Smart JD. The basics and underlying mecha-nisms of mucoadhesion. Adv Drug Deliv Rev. 2005;57 (11):1556-68. doi:10.1016/j.addr.2005.07.001
28. Leichner C, Jelkmann M, Bernkop-Schnürch A. Thiolated polymers: bioinspired polymers utiliz-ing one of the most important bridging structures in nature. Adv Drug Deliv Rev. 2019;151:191-221. doi:10.1016/j.addr.2019.04.007
29. Ijaz M, Bernkop-Schnürch A. Preactivated thiomers: their role in drug delivery. Expert Opin Drug Deliv. 2015;12 (8):1269-81. doi:10.1517/17425247.2015.1005598
30. Bonengel S, Bernkop-Schnürch A. Thiomers—from bench to market. J Control Release. 2014;195:120-9. doi:10.1016/j.jconrel.2014.06.047
31. Franz-Montan M, Ribeiro LNDM, Volpato MC, Cereda CMS, Groppo FC, Tofoli GR, et al. Recent advances and perspectives in topical oral anesthe-sia. Expert Opin Drug Deliv. 2017;14 (5):673-84. doi:10.1080/17425247.2016.1227784
32. 33.Pan Z, Zhang X, Xie W, Cui J, Wang Y, Zhang B, et al. Revisited and innovative perspectives of oral ulcer: from biological specificity to local treatment. Front Bioeng Biotechnol. 2024;12:1335377. doi:10.3389/fbioe.2024.1335377
33. Hock N, Racaniello GF, Aspinall S, Denora N, Khutoryanskiy VV, Bernkop-Schnürch A. Thio-lated nanoparticles for biomedical applications: mimicking the workhorses of our body. Adv Sci (Weinh). 2022;9 (1):2102451. doi:10.1002/advs.202102451

HOW TO CITE: Adhikari Ishwari L., Jadhav Mohit M., Araj Ranee D., Adhikari Samidha S., Padwal Krutika B., A Comprehensive Review on Mucoadhesive Buccal Film:Polymer Selection and Evaluation Techniques, Int. J. of Pharm. Sci., 2026, Vol 4, Issue 11, 2295-2303. https://doi.org/10.5281/zenodo.24271253