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(REVIEW ARTICLE)



Prospective designing and types of buccal drug delivery system: The Review

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Abstract

Buccal bioadhesive 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. The mucosa of the buccal cavity is the most easily accessible transmucosal site. This fast dissolving drug delivery system (FDDS) is suited for the drugs which undergo high first pass metabolism and is used for improving bioavailability with reducing dosing frequency to mouth plasma peak levels, which in turn minimize adverse/side effects and also make it cost effective. This article aims to review the recent Designs of buccal patches and their developments in the buccal adhesive drug delivery systems, & 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.

Keywords: Bioadhesive film; Bioavailability; Buccal patches.

1. Introduction

When the adhesive attachment is to mucus or a mucous membrane, the phenomenon is referred to as mucoadhesion. Now the main question arises that what are fast dissolving buccal films. [1] A fast-dissolving buccal film drug delivery system, in most cases, is a film containing active ingredient that dissolves or disintegrates in the saliva remarkably fast, within a few seconds. [2] Many fast-dissolving tablets are soft, friable, and/or brittle (such as the lyophilized dosage forms) and often require specialized and expensive packaging and processing. These tablets are either very porous or inherently soft-moulded matrices, or tablets compacted at very low dissolution/disintegration time. The delivery system is simply placed on a patient's tongue or any oral mucosal tissue [3]. Instantly wet by saliva, the film rapidly hydrates and adheres onto the site of application. It then rapidly disintegrates and dissolves to release the medication for oral mucosal absorption or with formula modifications, will maintain the quick-dissolving aspect but allow for gastrointestinal absorption to be achieved when swallowed [4].

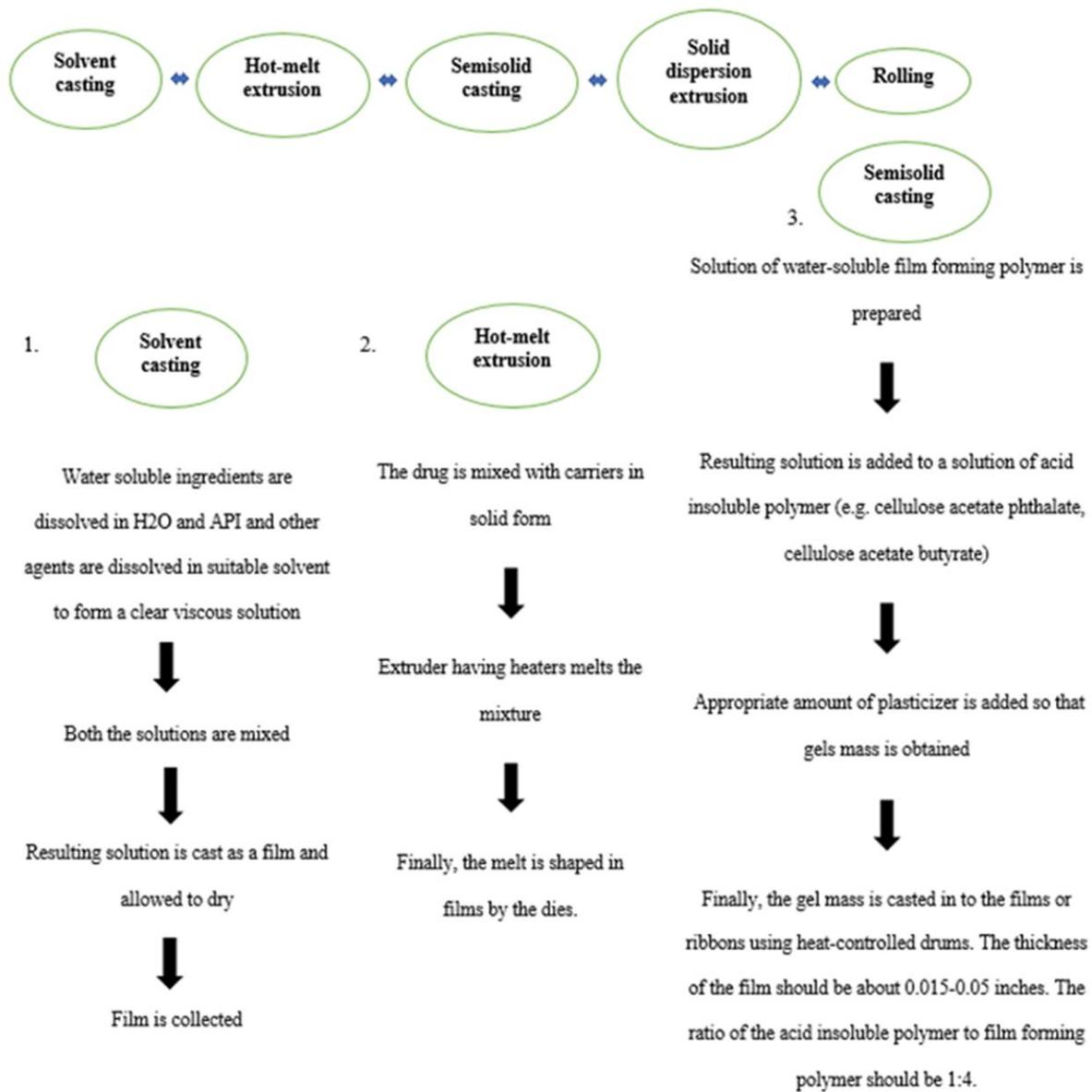
1.1. Merits

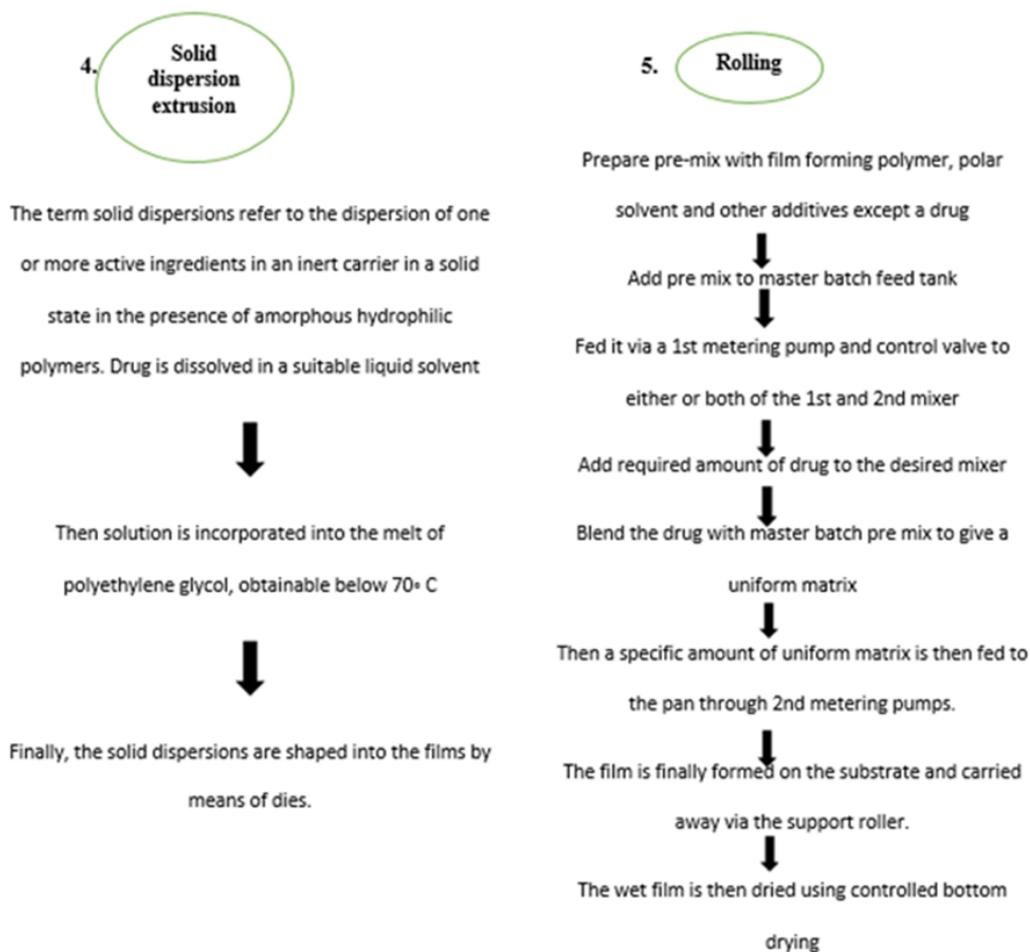
- The oral mucosa has a rich blood supply. Drugs are absorbed from the oral cavity through the oral mucosa, and transported through the deep lingual or facial vein, internal jugular vein and brachiocephalic vein into the systemic circulation [5].

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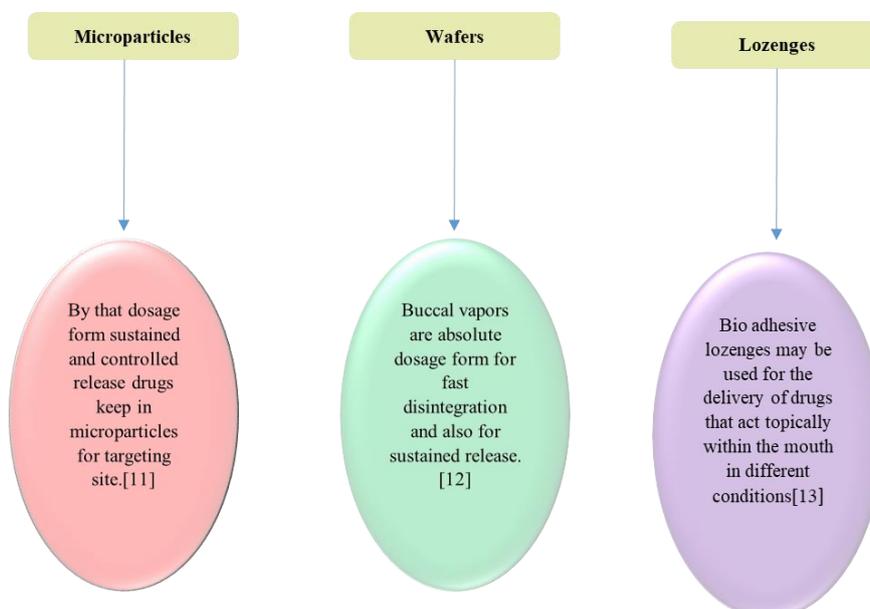
- Buccal administration, the drug gains direct entry into the systemic circulation thereby bypassing the first pass effect. Contact with the digestive fluids of gastrointestinal tract is avoided which might be unsuitable for stability of many drugs like insulin or other proteins, peptides and steroids. In addition, the rate of drug absorption is not influenced by food or gastric emptying rate [6].
- The area of buccal membrane is sufficiently large to allow a delivery system to be placed at different occasions, additionally; there are two areas of buccal membranes per mouth, which would allow buccal drug delivery systems to be placed, alternatively on the left and right buccal membranes [7].
- Buccal patch has been well known for its good accessibility to the membranes that line the oral cavity, which makes application the oral cavity, which makes application painless and with comfort.
- Patients can control the period of administration or terminate delivery in case of emergencies. The buccal drug delivery systems easily administered into the buccal cavity. The novel buccal dosage forms exhibit better patient compliance.[8]

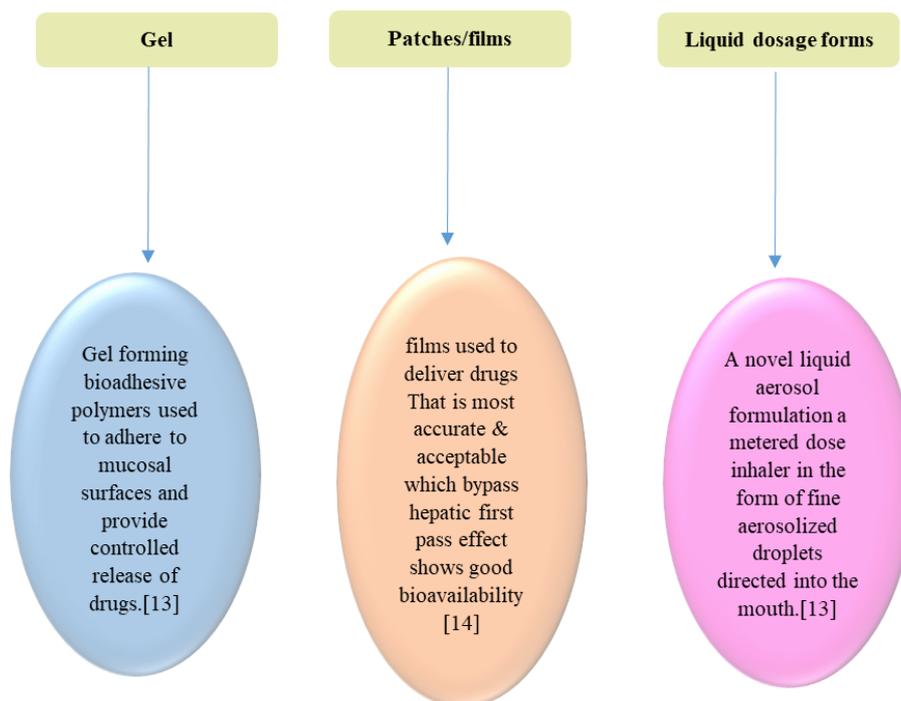
1.2. Different Methods of Manufacturing [9, 10]





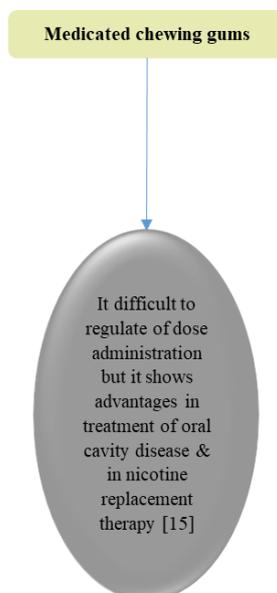
1.3. Innovative Designs of Buccal Administration





1.4. Pipeline Development of Buccal Drug Delivery system

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. Clinical translation of a new dosage form is only justified when improved safety, patient compliance, improved cost compared to available marketed products, and regulatory requirements have been proven. The complexity of the manufacturing process of novel formulations irrespective of the efficacy of therapeutic formulations also hinders their clinical translation. Therefore, simplification of the manufacturing process to meet safety, efficacy, and regulatory requirements is needed to develop novel buccal dosage forms.[16] The future challenge of pharmaceutical scientists will not only be polypeptide cloning and synthesis, but also to develop effective non-parenteral delivery of intact proteins and peptides to the systemic circulation.



Buccal permeation can be improved by using various classes of transmucosal and transdermal penetration enhancers such as bile salts, surfactants, fatty acids and derivatives, chelators and cyclodextrins [17].

1.5. Dosage form

Following are the dosage form which are on developing stages.

1.5.1. Bioadhesive Spray

Buccoadhesive sprays are gaining popularity over other dosage forms because of flexibility, comfort, high surface area and availability of drug in solution form. The fentanyl Oralet™ is the first FDA-approved (1996) formulation developed to take advantage of oral transmucosal absorption for the painless administration of an opioid in a formulation acceptable to children [18].

In 2002, the FDA approved Subutex (buprenorphine) for initiating treatment of opioid dependence (addiction to opioid drugs, including heroin and opioid analgesics) and Suboxone (buprenorphine and naloxone) for continuing treatment of addicts. In 2005, Oral-lyn buccal spray was approved for commercial marketing and sales in Ecuador.

1.5.2. Gel Forming Liquids

This type of a formulation is liquid upon instillation and undergoes a phase transition to form a viscoelastic gel in response to stimulus such as temperature, ionic strength or pH. Carbomers become more viscous upon increased pH. Poloxamers and smart hydrogel® (Advanced medical solution) gel at approximately body temperature [19].

Gellan gum and alginate both form gel in response to increased ionic strength (particularly with Ca²⁺ ions). Gel forming formulations are currently used for sustained ocular delivery. Recent work has examined the oesophageal retention of smart Hydrogel [20], a liquid that gels in response to both high force and temperature⁷⁸, with its gelling temperature at about 32°C.

2. Conclusion

The formulation of these drug delivery systems depends on the developments of suitable polymers with excellent mucosal adhesive properties, stability and biocompatibility. The main advantages of the buccal route of administration over the traditional per oral route are The mucosa is well supplied with both vascular and lymphatic drainage and drug degradation in the stomach is avoided, first-pass metabolism is avoided by that we can conclude that, Fast dissolving buccal films can be a better option to optimize therapeutic efficacy of various active pharmaceutical ingredients in the future.

Compliance with ethical standards

Acknowledgments

The authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis, and thankful to Guide, and Principal for their support.

Disclosure of conflict of interest

All authors should have not any conflict of interest.

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