International Journal of Medical and Pharmaceutical Sciences
Open access peer-reviewed Journal
Volume 2, Issue 1, Page 33-37.
https://doi.org/10.5281/zenodo.18130506

Review Article

Comprehensive Review on Fast Melting Mouth Dissolving Chocolate Strip

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For young patients, medicated chocolates and medicated lollipops are quite appropriate dose forms because traditional formulations like tablets and capsules frequently have drawbacks. Alternative drug delivery methods have been required due to challenges such the drug's bitterness and children's incapacity to swallow solid dosage forms. In order to overcome these obstacles, scientists have developed medicated lollipops and chocolate drug delivery systems (medicated chocolates), which improve patient compliance by increasing visual appeal. This study offers a fresh viewpoint on the use of hot-melt extrusion technology in the creation of fixed-dose combos, fast-dissolving films, and oral disintegrating tablets. Previous studies investigated these dosage forms using traditional formulation methods, which have inherent disadvantages such batch manufacturing constraints and the need for significant amounts of solvents. By using hot-melt extrusion, the current study aims to address these issues and provide better manufacturing efficiency, easier administration, and less frequent dosing. This creative method greatly improves patient convenience and therapeutic outcomes while also streamlining the production process.

Keywords: Fast Melting, medicated chocolates and medicated lollipops, Mouth Dissolving.

INTRODUCTION

Pediatrics is the area of medicine that focuses on the emotional, social, and physical well-being of children and teenagers. Preterm neonates, term and postterm neonates, infants, toddlers, children, and adolescents are among the various subgroups that make up the pediatric population. However, evaluating and developing age-appropriate treatment plans can be difficult due to the lack of agreement on the maximum age limit that defines pediatric patients. [1] The creation of specific pediatric formulations is vital to address the common and potentially dangerous practice of off-label administration of drugs that were first approved for adults but are administered to young patients. However, a number of obstacles frequently impede the development of pediatric medication formulations, including the requirement for dosage flexibility, difficulties in swallowing solid forms, unpleasant taste or poor palatability, and the complex physiological and developmental variations observed across the pediatric age spectrum. [2]

Types of Chocolates.

1. Milk Chocolate

Cocoa solids and milk, either liquid, powdered, or condensed, are combined to make milk chocolate. In Vevey, Switzerland, Swiss confectioner Daniel Peter worked with Henri Nestlé to develop it for the first time in 1875. Milk chocolate is the most popular type in the world because of its sweet flavor and creamy texture.

2. Dark chocolate:

They are made with a lot of cocoa and are also referred to as "plain chocolate" and "black chocolate." Most people consume dark chocolate uncooked. It often has

a high cocoa content, with sales ranging from 70% to 99%. Dark chocolate has comparatively less sugar and more antioxidants like polyphenols.

3. White Chocolate

White chocolate is made from cocoa butter, sugar, and milk solids but does not contain cocoa solids. It is pale yellow or ivory in color and often flavored with vanilla or fruit extracts such as strawberry. The absence of cocoa solids gives it a sweet, creamy taste rather than a deep chocolate flavor.

4. Cocoa Powder

The majority of the cocoa butter is extracted from cocoa liquor to create cocoa powder. When combined with milk and sugar, it is frequently used in baking or as a beverage ingredient. There are two primary types: Dutch-processed cocoa, which is treated with alkali to counteract acidity, and natural cocoa powder, which is made using the Broma method. Dutch processing, however, lowers the flavonoid content. Hershey stopped using pure Dutch-process European-style cocoa in 2005 and switched to a "Special Dark" blend that combined natural and Dutch-process cocoa.

5. Unsweetened Chocolate

Also called bitter or baking chocolate, unsweetened chocolate is made from pure ground roasted cocoa beans mixed with a small amount of cocoa butter. It has a strong, intense chocolate flavor and is primarily used as a base for cakes, brownies, and other desserts after sugar is added.

6. Bittersweet Chocolate

Bittersweet chocolate consists of chocolate liquor mixed with cocoa butter, small amounts of sugar, vanilla, and sometimes lecithin. It contains less sugar and more cocoa liquor than semisweet chocolate. Both bittersweet and semisweet varieties are often called couverture chocolate, which must contain at least 32% cocoa butter. The higher the cocoa content, the richer and less sweet the chocolate tastes.

FORMULATION METHOD

Chocolate formulations that include a precisely calculated dosage of a medication in each chocolate piece are referred to as medicated chocolate. By providing a tasty and kid-friendly dose form, these chocolates increase pediatric patients' compliance. The medication is added to molten chocolate along with appropriate excipients such stabilizers, sweeteners, and emulsifiers as part of the formulation process. After that, the mixture is shaped into homogeneous chocolate squares, each of which has the active ingredient at the appropriate therapeutic dosage. To preserve stability, texture, and flavor, the medicated chocolates are kept in airtight containers after cooling and solidifying. These medicated chocolates are a useful dose form for kids and those who have trouble swallowing tablets or capsules because they mix the flavor and acceptability of confectionery with the therapeutic effects of medications.

a. Evaluation Tests

The prepared medicated chocolate formulations were evaluated for various physicochemical, organoleptic, and performance parameters to ensure uniformity, stability, and acceptability.

1. Organoleptic Evaluation

The chocolates were examined visually and sensorially for color, odor, taste, appearance, and texture. Each parameter was assessed by a small panel to ensure palatability and consumer acceptability, especially for pediatric use.

2. Weight Variation

Ten randomly selected chocolate units were individually weighed using an analytical balance. The average weight and percentage deviation were calculated to ensure uniform drug distribution and consistency in each dose unit.

3. Thickness and Diameter

Each chocolate piece was measured using a digital vernier caliper to determine thickness and diameter uniformity. These dimensions ensure consistency in dosage and molding precision.

4. Hardness / Breaking Strength

The hardness of the medicated chocolates was determined using a hardness tester. It reflects the mechanical strength of the formulation and its ability to withstand handling and transportation without breaking.

5. Drug Content Uniformity

A specific quantity of medicated chocolate was dissolved in a suitable solvent, filtered, and analyzed using a UV–visible spectrophotometer at the drug's respective wavelength (e.g., 231 nm for cetirizine). The measured absorbance values were used to calculate the percentage drug content in each unit.

6. Melting Point / Disintegration Test

The melting or disintegration time was determined by placing the chocolate sample in the oral cavity (in vivo) or in a 37 ± 0.5 °C simulated saliva solution (in vitro). The time required for complete melting or dispersion was recorded. A shorter melting time indicates faster drug release and better patient compliance.

7. In-Vitro Drug Release Study

The drug release profile was evaluated using a USP dissolution apparatus containing simulated saliva fluid (pH 6.8) at 37 ± 0.5 °C and 50 rpm. Samples were withdrawn at predetermined intervals, filtered, and analyzed spectrophotometrically. The results were used to determine the percentage of drug released over time.

8. Stability Study

The optimized formulations were stored at different temperature conditions (e.g., 25 °C ± 2 °C / 60% RH and 40 °C ± 2 °C / 75% RH) for 30 days to evaluate changes in color, taste, hardness, and drug content. Results were compared with initial values to assess stability.

Use of UV–Visible Spectroscopy

UV–Visible Spectroscopy is an analytical technique used to quantify the concentration of drugs in pharmaceutical formulations. It operates on the principle that molecules absorb light at specific wavelengths, and the amount of light absorbed is directly proportional to the concentration of the analyte, according to Beer–Lambert's Law. In the present formulation study, UV–Visible Spectrophotometry was employed for the following purposes:

1. Drug Content Uniformity:

The medicated chocolate samples were dissolved in a suitable solvent, filtered, and analyzed using a UV–Visible spectrophotometer at the characteristic wavelength of the active drug (e.g., Cetirizine at 231 nm). The absorbance readings were used to calculate the percentage of drug present in each unit, ensuring uniform distribution of the drug throughout the formulation.

2. In-Vitro Drug Release Study:

Samples withdrawn at regular intervals from the dissolution medium (simulated saliva, pH 6.8) were analyzed spectrophotometrically to determine the amount of drug released over time. This provided information about the release kinetics.

Advantages of UV–Visible Spectroscopy:

Simple, rapid, and cost-effective method. High sensitivity and precision for quantitative estimation. Non-destructive analysis suitable for routine quality control. Provides a palatable and easy-to-administer dosage form, ideal for children who have difficulty swallowing tablets or capsules.

1. Taste Masking:

Masks the bitter or unpleasant taste of many pediatric medications, improving acceptability and adherence.

2. Rapid Drug Action:

Quickly disintegrates in the mouth, allowing faster absorption and onset of therapeutic effect.

3. Accurate Dosing:

Each strip contains a pre-measured amount of drug, ensuring safe and precise administration for children.

4. Convenience and Portability:

Thin, lightweight, and easy to carry, suitable for home, school, or travel use.

5. Reduced Risk of Choking:

Dissolves rapidly in the mouth, minimizing choking hazards for infants and young children.

6. Versatile Drug Delivery:

Can be used for antihistamines, antiemetics, vitamins, analgesics, and other pediatric medications.

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Cite: Punam Payghon, Ravindra Hanwate*, Roshan Rathod, R. M. Kawade, N. S. Khairnar, Comprehensive Review on Fast Melting Mouth Dissolving Chocolate Strip, Int. J. Med. Pharm. Sci., 2026, 2 (1), 33-37. https://doi.org/10.5281/zenodo.18130506