



## **A Comprehensive Study on Lozenges: Formulation, Quality Control, and Therapeutic Applications**

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### **ABSTRACT:**

Lozenges are a unique dosage form designed for localized delivery of therapeutic agents to the oral cavity and throat. This review explores the formulation, mechanism of action, and clinical applications of lozenges, emphasizing their role in treating symptoms associated with cough, sore throat, and oral diseases. Various types of lozenges, including medicated, herbal, and sugar-free variants, are examined, highlighting their active ingredients and the influence of excipients on the release and absorption of these agents. Additionally, the review discusses the pharmacokinetics of lozenges, patient adherence factors, and the evolving landscape of over-the-counter options. By synthesizing current research and market trends, this review aims to provide insights into the therapeutic potential of lozenges and their significance in pharmaceutical practice.

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**KEYWORDS :-** Lozenge, Troches

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### **INTRODUCTION:-**

Lozenges have emerged as a popular dosage form for delivering therapeutic agents directly to the oral cavity, providing localized relief for a variety of conditions, particularly those affecting the throat and mouth. Traditionally used for soothing sore throats and alleviating cough symptoms, lozenges serve as a convenient and effective option for patients seeking symptomatic relief without the need for invasive administration routes.

The formulation of lozenges typically involves a combination of active ingredients—such as analgesics, antiseptics, and demulcents—along with excipients that enhance taste, texture, and stability. This unique delivery system allows for gradual dissolution in the oral cavity, promoting sustained release of the active ingredients, which can enhance therapeutic efficacy while minimizing systemic absorption.

In recent years, the range of lozenges available on the market has expanded significantly, encompassing both medicated and herbal varieties, as well as sugar-free options to cater to diverse patient needs. This diversification reflects a growing recognition of patient preferences and the importance of adherence to treatment regimens.

This review aims to provide a comprehensive overview of lozenges, including their formulation, mechanisms of action, and clinical applications. By examining current research and trends, this work will highlight the therapeutic potential of lozenges in modern pharmacy practice and their role in improving patient outcomes.

**DEFINATION :-** “Lozenges are solid dosage form containing the flavoring and sweetening agents that are intended to dissolve or disintegrate slowly in the mouth or oral cavity”. They are most often used for localized effect into oral cavity and can also show systemic effect if it is well absorbed in the buccal lining and pharynx



Fig:-Strepsils

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**ADVANTAGES:-**

1. **Localized Delivery:** Lozenges provide targeted relief by delivering active ingredients directly to the oral cavity and throat, making them effective for conditions like sore throats and coughs.
2. **Ease of Use:** They are simple to administer, requiring no special equipment or techniques, making them accessible for patients of all ages.
3. **Palatability:** Many lozenges are formulated with flavors and sweeteners, enhancing taste and improving patient compliance, especially among children.
4. **Sustained Release:** The slow dissolution of lozenges allows for a prolonged release of active ingredients, providing extended relief compared to some other dosage forms.
5. **Reduced Systemic Side Effects:** By focusing on local action, lozenges often minimize systemic absorption, which can help reduce potential side effects associated with oral medications.
6. **Versatility:** Lozenges can accommodate a wide variety of active ingredients, including analgesics, antiseptics, vitamins, and herbal extracts, catering to diverse therapeutic needs.
7. **Non-Invasive:** They provide an alternative to injections and other invasive therapies, appealing to patients who may be uncomfortable with such methods.
8. **Convenience:** Lozenges are portable and do not require water for administration, making them easy to use on the go.
9. **Patient Preference:** Many patients prefer lozenges over other dosage forms due to their ease of use and immediate availability of relief.
10. **Customizability:** Pharmacists can potentially customize lozenge formulations to meet individual patient needs, providing tailored therapeutic solutions.

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**DISADVANTAGES:-**

- Limited Dosage:** Lozenges may not deliver high doses of active ingredients compared to other forms, which can be a limitation for certain medications.
- Slow Onset:** The therapeutic effects can take longer to manifest as they dissolve slowly, which might not be suitable for urgent relief.
- Taste and Texture:** Some patients may find the taste or texture unappealing, which can affect compliance.
- Local Effects Only:** Lozenges primarily provide local relief, making them less effective for systemic conditions.
- Potential for Overuse:** Easy access and pleasant flavors might lead to overconsumption, posing risks of side effects or toxicity.
- Ingredient Sensitivities:** Some individuals may be allergic or sensitive to certain ingredients, limiting their use.

**Types of Lozenges**

1. **Medicated Lozenges:**
  - **Antiseptic Lozenges:** Contain ingredients like benzocaine or menthol to provide relief from sore throats and coughs.
  - **Cough Lozenges:** Often include cough suppressants or expectorants to alleviate cough symptoms.

2. **Herbal Lozenges:**
  - Made from natural extracts such as honey, echinacea, or licorice, these lozenges are often marketed for their soothing properties and are popular among those seeking natural remedies.
3. **Sugar-Free Lozenges:**
  - Formulated with sugar substitutes (like xylitol or aspartame) for patients who need to manage sugar intake, such as diabetics. These lozenges maintain taste while reducing calorie content.
4. **Vitamin and Supplement Lozenges:**
  - These contain vitamins (e.g., vitamin C) or minerals aimed at boosting health, especially during cold and flu season.
5. **Throat Lozenges:**
  - Specifically designed to coat and soothe the throat, often incorporating demulcents to provide a protective barrier against irritation.
6. **Nicotine Lozenges:**
  - Used as a smoking cessation aid, these lozenges deliver controlled doses of nicotine to help reduce withdrawal symptoms and cravings.
7. **Flavored Lozenges:**
  - Available in various flavors to enhance palatability, making them more appealing to both children and adults.
8. **Functional Lozenges:**
  - These may include ingredients aimed at promoting oral health, such as xylitol for cavity prevention or probiotics for gut health.

#### Classification of Lozenges

1. **By Purpose:**
  - **Therapeutic Lozenges:** Designed for medicinal purposes, providing relief from specific ailments (e.g., cough, sore throat).
  - **Dietary Lozenges:** Contain vitamins, minerals, or herbal extracts intended for nutritional support.
2. **By Composition:**
  - **Medicated Lozenges:** Contain active pharmaceutical ingredients (APIs) such as analgesics, anti-inflammatory agents, or antiseptics.
  - **Herbal Lozenges:** Made primarily from herbal extracts or natural ingredients, often marketed for their soothing properties.
  - **Sugar-Free Lozenges:** Formulated without sugar, using sugar substitutes to cater to health-conscious individuals or diabetics.
3. **By Release Mechanism:**
  - **Immediate-Release Lozenges:** Dissolve quickly to provide rapid relief.
  - **Controlled-Release Lozenges:** Formulated to dissolve slowly, providing a prolonged therapeutic effect.
4. **By Formulation:**
  - **Hard Lozenges:** Typically made from sugar and corn syrup, providing a longer-lasting effect.
  - **Soft Lozenges:** Made with a chewy base, often containing glycerin, providing a more immediate soothing effect.
5. **By Target Population:**
  - **Adult Lozenges:** Designed for adult use, often containing stronger formulations.

**Children's Lozenges:** Formulated with milder ingredients and appealing flavors to suit younger patients.

6. **By Mechanism of Action:**
  - **Demulcent Lozenges:** Coat the throat to provide a soothing effect.
  - **Antiseptic Lozenges:** Contain antimicrobial agents to help reduce infection or irritation.

#### Methods of Preparation for Lozenges

1. **Melt Casting Method:**

- **Process:** The active ingredients, sugar, and other excipients are mixed and heated until melted. The mixture is then poured into molds and allowed to cool and solidify.
- **Advantages:** This method is simple and effective for creating uniform lozenges with a smooth texture.

## 2. Compression Method

This method is similar to tablet manufacturing. It involves compressing powdered ingredients into lozenge shapes using a tablet press. The compression method is typically used for hard lozenges.

### Steps in the compression method:

1. **Preparation of Ingredients:**
  - Weigh and blend active ingredients, fillers, and binders (e.g., sorbitol, lactose).
  - Mix flavoring agents and lubricants (e.g., magnesium stearate) for better flow and palatability.
2. **Granulation:**
  - Wet granulation or dry granulation may be used to ensure uniform particle size and prevent segregation.
3. **Compression:**
  - The granules are fed into the hopper of a tablet press machine, where they are compressed into lozenges of the desired shape and size.
4. **Coating (optional):**
  - If a protective or taste-masking coating is required, the lozenges can be coated with sugar or film-forming materials.

### Advantages:

- Faster and less expensive than molding.
- Allows for precise control of dosage and uniformity.

### Disadvantages:

- Compression may limit the flavor or texture options due to high pressure.

## 2. Suction Method (Suction and Dissolution):

- **Process:** A mixture of active ingredients and excipients is prepared, then heated to form a syrup. The syrup is cooled and shaped into lozenges, which are then dried.
- **Advantages:** This method is useful for incorporating heat-sensitive ingredients, preserving their efficacy.

## 3. Glycolic Method:

- **Process:** Ingredients are mixed with a glycerin base to form a viscous solution, which is then shaped into lozenges and allowed to harden.
- **Advantages:** This method results in soft lozenges that dissolve quickly and provide immediate relief.

## 4. Extrusion Method:

- **Process:** The mixture is extruded through a machine to form a continuous strand, which is then cut into individual lozenges. This method is often used for soft or chewable lozenges.
- **Advantages:** This process is efficient for mass production and allows for easy customization of shapes and sizes.

## 5. Spray Drying Method:

- **Process:** A liquid mixture containing the active ingredient is atomized into a drying chamber, where it rapidly evaporates, leaving behind dry lozenge particles. These particles can then be formed into lozenges.
- **Advantages:** This method helps maintain the stability of sensitive compounds and can create a uniform product.

## 7. Molding Method

The molding method is often used for soft lozenges or hard candy-type lozenges. This involves heating the ingredients until they melt and then pouring them into molds where they cool and solidify.

**Steps in the molding method:**

1. **Melting the Base:**

- For hard lozenges, sugar or sugar substitutes like sorbitol are melted along with the active ingredients. The mixture is heated to a high temperature (around 150–160°C) until the sugar melts.
- For soft lozenges, the base (e.g., gelatin, pectin, or polyethylene glycol) is heated gently to avoid caramelization.

2. **Incorporation of Active Ingredients:**

- Once the base is melted, the active ingredients (such as menthol, dextromethorphan, or local anesthetics) are incorporated into the mixture.
- Flavoring agents (e.g., mint, honey, or fruit extracts) and coloring agents are added at this stage.

3. **Pouring into Molds:**

- The molten mixture is poured into molds of the desired shape and size. Silicone or metal molds are commonly used.
- The molds are allowed to cool at room temperature or placed in a refrigerator to speed up solidification.

4. **Demolding and Packaging:**

- Once the lozenges have hardened, they are removed from the molds and packaged for use.

**Advantages:**

- Better for making lozenges with unique shapes, flavors, and textures.
- Allows for the inclusion of temperature-sensitive ingredients (soft lozenges).

**Disadvantages:**

- Requires more time and equipment.
- Some active ingredients may degrade at high temperatures (especially in hard lozenges).

**8. Fusion Method (For Gummy Lozenges)**

This is similar to the molding method and is used to make gummy or chewable lozenges.

**Steps in the fusion method:**

1. **Preparation of Gel Base:**

- A mixture of gelatin, agar, or pectin is dissolved in water and heated to form a gel-like base.

2. **Addition of Ingredients:**

- Active ingredients, sweeteners, flavoring agents, and colors are added to the base while stirring.

3. **Molding:**

- The mixture is poured into molds and allowed to set at room temperature or refrigerated.

4. **Demolding:**

- Once firm, the gummy lozenges are removed from the molds and coated with a fine powder (e.g., corn starch) to prevent sticking.

**Advantages:**

- Suitable for patients who prefer soft or chewable dosage forms.
- Good for heat-sensitive ingredients.

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**FORMULATION OF LOZENGES :**

1. **Active Ingredients:**

- **Purpose:** Provide therapeutic action (e.g., analgesic, antitussive, antimicrobial).

- **Examples:** Benzocaine (local anesthetic), dextromethorphan (cough suppressant), menthol (cooling agent), amylmetacresol (antiseptic), cetylpyridinium chloride (antimicrobial).
2. **Base Material:**
- **Purpose:** Forms the bulk of the lozenge and determines the lozenge type (hard, soft, or chewable).
  - **Examples:**
    - **Hard lozenges:** Sucrose, glucose, sorbitol (sugar-free).
    - **Soft lozenges:** Polyethylene glycol (PEG), acacia gum, gelatin.
    - **Chewable lozenges:** Gelatin, pectin, glycerin.
3. **Binding Agents:**
- **Purpose:** Help hold the lozenge together and ensure it maintains its shape during storage.
  - **Examples:** Acacia, gelatin, maltodextrin.
4. **Sweetening Agents:**
- **Purpose:** Enhance the taste and improve patient compliance.
  - **Examples:** Sucrose, fructose, glucose syrup, sorbitol, mannitol, or artificial sweeteners like aspartame and sucralose (for sugar-free formulations).
5. **Flavoring Agents:**
- **Purpose:** Improve palatability and mask the unpleasant taste of active ingredients.
  - **Examples:** Mint, honey-lemon, cherry, orange, eucalyptus, licorice.
6. **Coloring Agents:**
- **Purpose:** Provide aesthetic appeal and brand recognition.
  - **Examples:** Food-grade colorants such as FD&C dyes (FDA approved) or natural colors (e.g., beet juice powder, turmeric).
7. **Lubricants (for compression method):**
- **Purpose:** Reduce friction between the lozenge and the machinery to ensure smooth processing.
  - **Examples:** Magnesium stearate, stearic acid, talc.
8. **Preservatives:**
- **Purpose:** Prevent microbial contamination, especially in soft lozenges with moisture content.
  - **Examples:** Methylparaben, propylparaben, potassium sorbate.
9. **Humectants (for soft lozenges):**
- **Purpose:** Help retain moisture and prevent lozenges from drying out or hardening.
  - **Examples:** Glycerin, propylene glycol.

#### Sample Formulation for a Medicated Hard Lozenge

**Active Ingredient:** Dextromethorphan HBr (cough suppressant) – 5 mg

#### Base Material:

- Sucrose (Sugar) – 60%
- Glucose Syrup – 30%

**Binding Agent:** Acacia – 1%

**Flavoring Agent:** Menthol – 0.5%

**Coloring Agent:** FD&C Red #40 – q.s.

**Preservative:** Potassium Sorbate – 0.1%

**Lubricant (for compression method):** Magnesium Stearate – 0.5%

#### Sample Formulation for a Soft Lozenge

**Active Ingredient:** Benzocaine (local anesthetic) – 10 mg

#### Base Material:

- Polyethylene Glycol (PEG 6000) – 45%
- Acacia Gum – 25%

**Sweetening Agent:** Sorbitol – 20%

**Humectant:** Glycerin – 5%

**Flavoring Agent:** Honey-lemon flavor – 2%

**Coloring Agent:** Natural Yellow (Turmeric Extract) – q.s.

**Preservative:** Methylparaben – 0.1%

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### THERAPEUTIC USES

- Sore Throat Relief:** Lozenges often contain soothing agents (like menthol or eucalyptus) and analgesics to relieve pain and irritation in the throat.
- Cough Suppression:** Many lozenges include cough suppressants that help alleviate coughing, especially those that accompany colds or respiratory infections.
- Oral Cavity Conditions:** Lozenges can be formulated to treat conditions like oral thrush or infections, using antifungal or antiseptic ingredients.
- Nicotine Replacement Therapy:** Nicotine lozenges help individuals quit smoking by providing a controlled dose of nicotine to reduce withdrawal symptoms.
- Dry Mouth Relief:** Some lozenges contain saliva substitutes to help alleviate xerostomia (dry mouth), often beneficial for patients on certain medications or those undergoing cancer treatment.
- Allergy Relief:** Certain lozenges may include antihistamines to help reduce symptoms associated with allergies.
- Vitamin and Mineral Supplementation:** Lozenges can also be fortified with vitamins (like vitamin C) or minerals to boost overall health or support the immune system.

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### EVALUATION OF LOZENGES

#### Quality control:-

- Identity Testing:** Ensures the active ingredients match the specifications.
- Assay:** Measures the concentration of active ingredients to confirm they meet label claims.
- Dissolution Testing:** Assesses how well the lozenge dissolves in saliva, impacting efficacy.
- Microbial Testing:** Checks for the presence of harmful microorganisms to ensure safety.
- Stability Testing:** Evaluates the product's shelf life and how its potency changes over time under various conditions.

#### Physical And Chemical Testing:

##### Physical Testing:

- Appearance:** Evaluates color, clarity, and overall visual quality of the lozenge.
- Size and Shape:** Ensures consistency in dimensions and shapes, which can affect dosage and patient compliance.
- Hardness Test:** Assesses the lozenge's hardness using a hardness tester to ensure it can withstand handling but dissolves adequately during use.
- Friability Test:** Measures the tendency of lozenges to crumble under stress, ensuring they maintain their integrity during packaging and transport.
- Weight Variation:** Determines the uniformity of weight among lozenges in a batch, ensuring consistency in dosing.
- Thickness Measurement:** Ensures uniformity in thickness, which can influence the dissolution and release rate.

### Chemical Testing

1. **Assay of Active Ingredients:** Quantifies the concentration of active compounds using methods like HPLC (High-Performance Liquid Chromatography) or UV-Vis spectroscopy.
2. **pH Testing:** Measures the pH of the lozenge formulation to ensure it is within the desired range for stability and efficacy.
3. **Dissolution Testing:** Analyzes the rate and extent of dissolution of the active ingredients in a simulated saliva environment.
4. **Stability Testing:** Assesses how the chemical composition of the lozenge changes under various environmental conditions (temperature, humidity) over time.
5. **Microbial Limits Testing:** Detects and quantifies any microbial contamination, ensuring the product is safe for use.
6. **Content Uniformity:** Tests for uniform distribution of active ingredients within individual lozenges to ensure consistent dosing.

### Stability Testing:-

**Stability testing:-** is an essential aspect of pharmaceutical formulation, including lozenges, to ensure that the product maintains its intended quality, safety, and efficacy over time under various environmental conditions. The goal is to assess how factors like temperature, humidity, and light affect the product, and to establish the appropriate storage conditions and shelf-life.

### Types of Stability Testing

1. **Accelerated Stability Testing**
  - **Purpose:** Predict the product's shelf-life in a shorter period by storing it under more stressful conditions (e.g., high temperature, high humidity).
  - **Conditions:** Typically carried out at elevated conditions such as  $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and  $75\% \pm 5\%$  RH (relative humidity) for 6 months.
  - **Outcome:** Provides an estimate of how long the lozenges will remain stable under normal storage conditions.
2. **Long-Term Stability Testing**
  - **Purpose:** Assess the stability of the product under normal storage conditions over its intended shelf-life.
  - **Conditions:** Typically conducted at  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and  $60\% \pm 5\%$  RH for up to 24 or 36 months.
  - **Outcome:** Confirms the product's shelf-life under regular storage conditions.
3. **Intermediate Stability Testing**
  - **Purpose:** Performed when accelerated testing shows the product may be sensitive to extreme conditions but is expected to be stable under less harsh conditions.
  - **Conditions:** Typically carried out at  $30^{\circ}\text{C} \pm 2^{\circ}\text{C}$  and  $65\% \pm 5\%$  RH for 12 months.
4. **In-use Stability Testing**
  - **Purpose:** Simulates the conditions under which the lozenges will be used, including repeated opening of the container, exposure to air, and environmental stressors.
  - **Outcome:** Ensures that the lozenge retains its properties while being used by consumers.

### Application of Lozenges:-

- 1) Lozenges are utilized in the management of both localized and systemic ailments.
- 2) They can incorporate a range of pharmaceutical agents aimed at alleviating conditions related to oral and throat infections, including oral thrush, sore throat, cough, gingivitis, and pharyngitis, as well as serving as decongestants.
- 3) Additionally, these formulations have been employed for systemic drug delivery in applications such as smoking cessation and pain management.

### Pharmaceutical Applications

#### a. Cough Suppressants and Sore Throat Relief

- Lozenges are commonly used to soothe and treat throat irritation, coughs, and minor oral infections.
- **Examples:** Lozenges containing menthol, eucalyptus, dextromethorphan, or benzocaine are used for their analgesic and local anesthetic effects.
- **Action:** The lozenge dissolves slowly, releasing the active ingredients gradually to provide prolonged relief.



#### b. Antiseptics and Antimicrobials

- Medicated lozenges can carry antiseptic agents to treat infections of the mouth, throat, or gums.
- **Examples:** Lozenges containing amylmetacresol, cetylpyridinium chloride, or chlorhexidine.
- **Action:** These lozenges help to kill or inhibit the growth of bacteria, fungi, and viruses, thus helping to control infection and prevent further spread.

#### c. Anti-inflammatory Agents

- Some lozenges contain anti-inflammatory agents to help reduce inflammation of the throat and oral cavity.
- **Examples:** Flurbiprofen lozenges, which are nonsteroidal anti-inflammatory drugs (NSAIDs), used to relieve throat pain caused by inflammation.

#### d. Local Anesthetics

- Lozenges can deliver local anesthetics for pain relief in the throat, mouth, or gums, especially in patients with oral ulcers, sore throats, or after dental procedures.
- **Examples:** Benzocaine, lidocaine.
- **Action:** Provides localized numbness, reducing pain sensation for temporary relief.

#### e. Nicotine Replacement Therapy

- Lozenges are used as a form of nicotine replacement therapy (NRT) for smoking cessation.
- **Examples:** Nicotine lozenges (Nicorette®) release a controlled dose of nicotine to help reduce cravings and withdrawal symptoms associated with quitting smoking.
- **Action:** The lozenge dissolves in the mouth, delivering nicotine into the bloodstream through the oral mucosa.

#### f. Antifungal Therapy

- Lozenges can be used to treat fungal infections in the oral cavity, such as oral thrush (candidiasis).
- **Examples:** Clotrimazole lozenges (Mycelex®) are used to treat fungal infections in the mouth and throat.
- **Action:** The lozenge releases antifungal agents over time, providing localized treatment.

#### g. Probiotic Lozenges

- Lozenges containing probiotics are designed to promote oral and gut health by delivering beneficial bacteria.
- **Examples:** Lozenges with Lactobacillus or Bifidobacterium strains.
- **Action:** They help to balance the oral microbiome, reduce bad breath, and prevent dental decay or gum disease.

### 2. Nutraceutical and Dietary Applications

#### a. Vitamin Supplements

- Lozenges are often used as a delivery system for vitamins and minerals, providing an alternative to tablets or capsules.
- **Examples:** Vitamin C lozenges for immune support, zinc lozenges for cold relief.
- **Action:** These lozenges dissolve slowly in the mouth, delivering vitamins and minerals directly through the oral mucosa and enhancing bioavailability.

#### b. Herbal and Natural Remedies

- Herbal lozenges are used to deliver natural remedies for various conditions, especially cold and flu symptoms.
- **Examples:** Lozenges with echinacea, ginger, honey, or licorice.
- **Action:** Herbal lozenges can provide soothing, antimicrobial, or immune-boosting effects.

### 3. Dental Applications

#### a. Dental Health and Cavity Prevention

- Lozenges can be used to promote oral hygiene and prevent dental cavities by releasing ingredients that protect the teeth and gums.

- **Examples:** Xylitol lozenges help reduce the risk of tooth decay by promoting saliva production and inhibiting bacterial growth.
- **Action:** Xylitol, a natural sugar substitute, does not contribute to tooth decay and may even prevent plaque formation.

#### b. Dry Mouth Relief

- Lozenges can be formulated to stimulate saliva production and alleviate dry mouth (xerostomia), a common issue in patients undergoing radiation therapy or those with certain medical conditions.
- **Examples:** Lozenges containing xylitol, glycerin, or citric acid.
- **Action:** These lozenges stimulate the salivary glands, helping to relieve the discomfort of dry mouth.

### 4. Other Applications

#### a. Breath Fresheners

- Non-medicated lozenges are widely used as breath fresheners, containing flavoring agents like mint, cinnamon, or other natural extracts.
- **Examples:** Mint-flavored lozenges with menthol or eucalyptus.
- **Action:** They temporarily mask bad breath and provide a cooling, refreshing sensation.

#### b. Energy Lozenges

- Lozenges formulated with caffeine or energy-boosting compounds can provide a quick energy boost without the need for liquids.
- **Examples:** Lozenges containing caffeine, guarana, or taurine.
- **Action:** These lozenges dissolve quickly, delivering a stimulating effect that helps increase focus and alertness.

### 5. Pediatric Applications

- Lozenges formulated specifically for children can provide a convenient, palatable dosage form for treating conditions such as cough, sore throat, or minor infections.
- **Examples:** Lozenges with honey, glycerin, or mild antiseptics for children's sore throat relief.
- **Action:** Gentle, effective ingredients designed for pediatric use help manage symptoms while being safe and well-tolerated.

### 6. Veterinary Applications

- Lozenges can also be adapted for veterinary use, particularly for animals that need regular medication in an easy-to-administer format.
- **Examples:** Lozenges containing deworming agents or oral care ingredients for pets.
- **Action:** Used to deliver medication to animals in a form they are more likely to accept.

Lozenges are versatile because they can target both local and systemic effects, making them a convenient delivery system for a range of therapeutic and preventative uses. The ability to dissolve slowly in the mouth allows for the controlled release of active ingredients, which is especially beneficial for treating oral and throat conditions. Let me know if you need more detailed information on any of these applications.

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## CONCLUSION:

Lozenges represent a formulation that is both efficient and time-saving. They are particularly well-accepted and preferred for pediatric patients. Medicated lozenges, commonly utilized for treating throat infections and sore throats, serve as an ideal dosage form for children. The advantages of lozenges include enhanced patient compliance, comfort, and effective treatment, characterized by a rapid onset of action. Additionally, they require a lower dosage, reduce the frequency of dosing, and are economically viable. Lozenges play a significant role in the field of pharmacy, having established a prominent position that is likely to be maintained in the future.

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