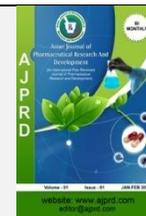


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Review Article

## Medicated Lozenges: A Review

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### ABSTRACT

A lozenge is a solid dose form of a medicine that is meant to dissolve in the mouth or throat. The creation of lozenges began in the 20th century and is continuing in use now. The advantages of lozenges include an increase in the duration of oral form retention in the oral cavity, which is beneficial. Bioavailability is improved. The difference lowers stomach distress and bypasses the first pass metabolism. Compressed lozenges, hard and soft lozenges are a form of lozenge that is available on the market. In this review, there is a method of preparation of lozenges with materials that is required for lozenges are addressed. This review also includes the research to date, classification, advantages, disadvantages, formulation evaluation, packaging, storage, uses and parameters of the study.

**Keywords:** Lozenge, Medication, Molding, Troches, Pastilles

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### INTRODUCTION:

The word "Lozenge" comes from the French word "Lozenge," which refers to a four-sided geometric diamond shape. Lozenge and pastille have been produced in pharmacies during the twentieth century and are still manufactured commercially.<sup>[1]</sup>

Molding or compression can be used to make lozenges, depending on the type. Molded Pastille is a type of lozenge, whereas troches are compacted lozenges.<sup>[2]</sup> Lozenge is a powerful, solid substance. An oral preparation that dissolves in the oral cavity or throat. It may include one or more of the ingredients. It's made up of substances in a sweet and sugary basis and is used to treat oral irritation or illness of throat, and may be utilized to aid in the absorption of drugs in a systematic manner.<sup>[2,3]</sup> Lozenges are designed to have a local effect on the throat, such as cooling and purring it. Coughs are occasionally relieved with them.

If the medicine is absorbed via the buccal linings or ingested, lozenges have a systemic effect.<sup>[3]</sup>

Lozenges are inserted into the mouth. Because the tongue's bottom extremities may be damaged, Buccal lozenges are well-formed and commonly utilized and are designed to be put due to their size. between the gums and the cheek

Although a lozenge can last up to 30 minutes, this is dependent on the individual.

By consuming the lozenge, the patient can manage the rate of excretion and absorption. until it was completely dissolved. As a result, the amount of medication supplied each time a lozenge is administered can vary significantly. Increased dilution and swallowing can also be caused by sucking and subsequent saliva production.<sup>[4-5]</sup> Lozenges are used for patients who are unable to swallow solid oral forms of drugs and pharmaceuticals that are meant to be released slowly in order to generate a continuous dose of the drug in the mouth or to wash the throat tissue with a drug solution. Analgesics, sedatives, antihistamines, aromatics, astringents, corticosteroids, anesthetics, antimicrobials, antiseptics, antitussives, antimicrobials, antiseptics, antitussives, antimicrobials, antiseptics, antitussives, decongestants and demulcents this are the commonly included drugs in lozenges. as there are other different medications that can be delivered through the lozenge. Depending on the need of particular patient<sup>[6]</sup>

There are a variety of lozenges available as over-the-counter (OTC) medicines where no prescription is required. Some medications require a prescription, while others are prescribed by a physician.

A lozenge is a solid dosage form that typically contains a medical drug as well as a flavouring agent. Lozenges, also known as Torch or Pastilles, are meant to melt slightly in the oral cavity (Mouth or Pharynx) with a local or systemic impact.



**Figure 1:** Medicated lozenges

#### **ADVANTAGES :**<sup>[7,8,9]</sup>

- It is quite simple to treat stomach patients and infants.
- Achieve a specific effect, by extending the time of the medicine in the oral cavity.
- It can be used without the use of water.
- Noninvasive technique, as is parenteral.
- It has the potential to lower dose frequency.
- can increase the onset of action or minimize gastrointestinal discomfort.
- It has the ability to bypass the first past metabolism.
- It has improved patient compliance.

#### **DISADVANTAGES:**<sup>[7,8,9]</sup>

- Lozenges are not suitable for children under the age of six.
- Aldehyde candy foundations may not be suitable for some digging. Benzocaine is an
- Grain is present in the hard lozenge.
- It can be used as a candy by children
- Training of the medication from the mouth to the stomach and salivary glands is a possible.
- High degree of preparation is required for hard lozenge sweets.
- The non-ubiquitous distribution of the drug within saliva from local treatment.

#### **CLASSIFICATION OF LOZENGES:**

##### **According to Site of Action :**

Lozenges are categorized into different types based on a variety of factors, such as the location of action, which might be local or systemic. Antiseptics and decongestants are examples of local effects, whereas vitamins and nicotine are instances of systemic effects.

##### **According to appearance and Composition**

##### **a) Chewy or Caramel Based Medicated Lozenges :**

Chewy or caramel lozenges are a type of dose in which the medicine is mixed with a caramel base and chewed rather than swallowed. The most common composition is a glycerinated gelatin suppository, which contains glycerin, gelatin, and water. The majority of these lozenges have a

strong fruit flavour. To mask the harsh glycerin flavor, it may have a somewhat acidic taste. Candy base is one of the primary ingredients. whipping agent, humectants, lubricants, flavours, and natural cures incorporated in lozenges. The candy foundation is made of combining sugar and corn syrup ratio of 50:50 to 75:25. To get the appropriate air content, whipping agents are utilized to inhale air into toffee-based confections to obtain soft chewing level. These are exemplified milk proteins, egg, starch, algin, gelatin, albumin, xanthan gum, pectin, and carrageenan. Lubricants are used to keep the sweets from sticking to the container. while chewing the vegetable oils and fats are included. Up to 35-40% of drugs can be recycled. Incorporated. The adding of powdered sugar to the candy at 3-10% heat involves crystal seeding. to hasten crystallization and enable the base to form tablets in a short period of time<sup>[19]</sup>

##### **Manufacturing of Chewy or Caramel Based Medicated Lozenges :**

The candy's base is baked to 95-125 °C Celsius and then put to a planetary or sigma blade mixer. At 120°C the bulk is allowed to cooldown. The addition of a beating agent is then done at 105 °C. The medications are subsequently added between 95 and 105 °C. A humectant is used to spread the colour, which is then added to the mixture. The mass above at a temperature greater than 90 °C. Below 85°C seeding crystals and flavours are added. followed by lubricant application of more than 80 °C. After that, the sweets are formed into ropes.

##### **b) Compressed Tablet Lozenges.**

If the active component is heat labile, compression can be used to make lozenges. The granulation is made same way that any compressed tablet is made. In terms of organoleptic and non-disintegrating characteristics and slightly soluble profiles. Lozenge pills differ from regular tablets.<sup>[2, 20]</sup>

It is preferable for the lozenge to solubilize slightly in the mouth, the lozenge is created with a hefty compression tool to give the tablet a stronger than typical strength. They are usually flat in size, weight, hardness, and erosion time, with dimensions of 5/8-3/4-inch, 1.5-4 g, 30-50 kg inch<sup>2</sup>, and 510 minutes respectively. Compressed lozenge ingredients are based on tablets or carriers such as dextrose and sucrose, other vehicles are sugar-free vehicles such as sorbitol, mannitol, (PEG) 6000 and 8000, polyethylene glycol. Other available vehicle include- Emdex, Nu-tab, Sweetrex, Mola-tab, Honey-tab, Sugar tab. Other fillers include dicalcium phosphate, calcium sulphate, calcium carbonate, lactose and microcrystalline cellulose. polyvinylpyrrolidone, Corn syrup, sugar syrup, gelatin, tragacanth, and methylcellulose are some of the binders used to hold weight particles like granules. The lubricants are used to help the final troche mixture flow better. mixture and include magnesium stearate, calcium stearate, stearic acid and PEG. The colors used include water soluble dyes and lakolene dyes.

##### **Manufacturing of compressed tablet lozenges.**

Direct compression and wet granulation are two methods for making compressed tablet lozenges. The components

are fully combined and compacted using direct pressure. The sugar content is pulverized to a fine powder in wet granulation by mechanical communication (40-80 mesh size). Medications are added and blended well, granulation with sugar or corn syrup is applied to the combined formulation and is tested with a 2-8 mesh screen. It goes behind drying and milling to a mesh size of 10-30. Flavor and emollients are then mixed before compression

### (c) Soft Lozenges:

They can be chewable or have a delayed release of the medicine in the mouth. Soft candy formulations may contain acacia and silica gel, and soft lozenges can be manufactured using PEG 1000 or 1450, chocolate or a sugar-acacia base. Acacia is used for texture and smoothness, while silica gel is employed as a binding agent. To prevent material from settling to the base of the mould cavity during cooling, use a suspending agent. Only heat-resistant materials are appropriate for formulation, which necessitates a heating process of around 50 °C. These are the amorphous (non crystalline) or glassy state of sugar and other carbohydrates. They can also be considered solid sugar syrups.

Only heat-resistant materials are appropriate for formulation, which necessitates a heating process of around 50 °C. These are an amorphous mixture of sugar and other carbohydrates (non crystalline) or a condition of glass. They're also known as solid sugar syrups.<sup>[2]</sup>

### Manufacturing of Soft Lozenges:

These lozenges can be folded by hand and cut into pieces, or a heated bulk can be poured into an elastic mold due to their soft texture. When utilizing PEG, such as PEG contractor as it cools, the mold should be overfilled. In the case of chocolate, this is not necessary because it does not shrink.<sup>[5]</sup> Fabricated clotazazole lozenge is in the form of a formula and features that affect the physical qualities of lozenge were investigated.

They discovered that adding more PEG 1500, xanthan gum or xylitol the lozenge's hardness was increased. The time it takes to disintegrate has been discovered to be longer, with increasing number of actives and hardness.<sup>[20, 21]</sup>

### Selection of drug carrier.<sup>[11]</sup>

### (d) Hard Candy Lozenges :

Hard candy lozenge is an amorphous (nanocrystalline) or glassy mixture of sugar and other carbohydrates. They can also be considered solid sugar syrups. Hard candy lozenge moisture content and weight should be between 0.5 to 1.5% and 1.5-4.5g respectively. These should dissolve slightly over 5-10 minutes, and should not disintegrate. The thermal requirements for their preparation are often high which is why heating materials cannot be installed [3] [20]. Ingredients for hard candy lozenge include body agent or corn syrup based on Baume base. The 43 ° Baume corn syrup is preferred in it. Sweeteners such as dextrose, sucrose, lactose and maltose are added. Acidulants are added to the candy base to enhance the flavor properties of the finished product. The most widely used acids are tartaric, citric, malic and fumaric acid. Colors include FD & C colors, orange colour paste, red cubes etc. while the flavors used include, cherry flavor, eucalyptus oil, spearmint, menthol, etc. Up to 2-4% of medicines can be added to hard candy lozenges. Salvage solution can be in the form of liquid or solid.<sup>[3]</sup>

### Manufacturing of Hard Candy Lozenges :

A candy base cooker is used to cook the candy base by dissolving the necessary amount of sugar in one-third amount of water. This is repeated until the temperature reaches 110°C. Corn syrup is mixed and heated until the temperature rises to 145-156 degrees. The candy mass is taken out of the cooker and transferred to a greased container settled onto a weight check scale. Where the mass is determined. After that, color is added in the form of color cubes, pastes, and solutions. Then it is placed to a stainless-steel water-jacketed cooling table. For combining flavours and the addition of medication and ground salvage is also done there. The mass is poured into a mold or pulled on a ribbon while cooling and cut to the desired length. Received lozenges are packaged.<sup>[3, 20]</sup>

### FORMULATION OF LOZENGES:<sup>[11]</sup>

The lozenge is meant to be stable, for super drug administration. Following ingredients are used for the preparation of lozenges.

Table 1 : Material of lozenges and their function [7]

Sr.No.	Ingredients	Examples	Role
1.	Candy base Sugar Sugar free	Dextrose, sucrose, maltose, lactose. Mannitol, sorbitol, PEG 600 & 800.	These are used as sweetening agent and impart the taste masking properties
2.	fillers	Di calcium phosphate, calcium sulfate, calcium carbonate, lactose, microcrystalline cellulose.	These are used to improve the flowability
3.	Lubricants	Magnesium stearate, calcium stearate, stearic acid and PEG, vegetable oils and fats.	These are used to avoid sticking of candy to the teeth.
4.	Binders	Acacia, corn syrup, sugar syrup, polyvinylpyrrolidone, gelatin, tragacanth, and methylcellulose	These are used to hold the particles.
5.	Coloring agent	Water soluble and lake dyes, FD & C colors, orange color paste, red color cubes, etc.	These are used to enhance appearance and organoleptic properties of dosage form.
6.	Flavoring agent	Menthol, eucalyptus oil, spearmint, cherry flavor, etc.	These are used to give a taste
7.	Whipping agent	Milk protein, egg albumin, gelatin, xanthan gum, starch, pectin, algin and carrageenan.	These are used in toffee-based confection

**Evaluation of medicated Lozenges:**<sup>[3,12,13,14,15,16,17]</sup>**[A] Quality control:**

- a) **Moisture analysis**
- b) **Gravimetric method :** For 12-16 hours, 1g of sample is placed in a vacuum oven at 60-70°C. We weigh the sample after the prescribed amount of time has passed, and the moisture content is determined by subtracting the final weight from the original weight.
- c) **Salvage solution** - Determined using a refractometer.
- d) **Forming checks-** Involves a check on candy rope diameter.
- e) **Cooling checks-** A visual inspection is conducted to look for stress cracking caused by rapid cooling, air bubble development, surface cracking, and black particles.

**[B] Physical and Chemical Testing**

- **Diameter and thickness-** The diameter of the lollipop is critical for consistency in lozenge size. Vernier Calipers can be used to measure it. The level at which the lozenge diameter is deviated from  $\pm 5\%$  of the standard value.
- **Hardness-** The hardness of the lozenges determines their resistance to shipping or breakage under the conditions of storage, travel, and handling prior to use. A Monsanto hardness tester can be used to determine the hardness of lollipops. The hardness was measured in kg / cm<sup>2</sup>.
- **Weight Variation** - the USP weight loss test was performed with a weight of 20 lozenge, with the average weight and individual weight rates calculated and compared.
- **Drug excipients interaction studies-** Determined by FTIR.
- **Friability** - Determined by Roche Friabilator operated at 25rpm for 4min.
- **In-vitro drug release-** This is carried out in USP II paddle type dissolution apparatus.
- **Drug content-** The absorption of the solution is measured spectrophotometrically after the necessary number of lollipops are crushed and dissolved in the appropriate solvent.<sup>[12,13]</sup>

**[C] Microbial check:**

In this case, the presence of any bacterial, fungal or spore contaminants is detected in the raw material, finished products, equipment, cooling stations, environmental conditions and storage containers. Microbial laboratory tests should include the following statistics:

- A complete plate
- Total coliform
- Staphylococcus

**[D] Stability testing:**<sup>[3]</sup>

Lozenges are subjected to stability testing under following conditions-

- 1-2 months at 60°C
- 3-6 months at 45°C
- 9-12 months at 37°C

**Packaging**<sup>[2]</sup>

Hygroscopic in nature on a local scale for complex packaging and more Since the adoption. Each unit is individually wrapped in a polymeric moisture barrier and placed in a sturdy or moisture-resistant glass, polyvinyl chloride, or metal container coated in aluminium foil or cellophane membrane.

**Storage:**<sup>[11]</sup>

This preparation should be kept out of direct sunlight and out of reach of childrens. It should be kept away from moisture. Room temperature and refrigerator temperature are often advised based on the requirements of both the medicine and the Abd base.

**Application of Lozenges:**<sup>[13]</sup>

- a) Local and systematic illness are commonly treated with lozenges.
- b) Oral thrush, sore throat, cough, gingivitis, pharyngitis, decongestants, and other oral and throat diseases can be treated and relieved by adding a range of medications to them.
- c) Lozenges have also been used to distribute medication in a systematic manner for smoking cessation and pain relief.

## Marketed Products:

**Table 2:** Marketed Lozenges and Their Ingredients.

Sr.no	Product	Main ingredient	Other ingredients	Indication	Marketed by
1.	VICKS®	methanol	ascorbic acid, citric acid, eucalyptus oil, FD&C Blue No. 1, FD&C Red No. 40, flavor, liquid glucose, sucrose.	sore throat	Procter and Gamble manufacturing company
2.	THERA ZINC®	Zinc (gluconate)	Vitamin A (Acetate) 500 IU, A proprietary blend of Slippery Elm Bark (Ulmus Fulva) f Echinacea (4: 1), Propolis, Elderberry, Larch and Mullein.	common cold & flu	Quantum health care
3.	STREPSILS®	Amylmetacresol, dichlorobenzyl alcohol	Hexylresorcinol, sucrose, glucose, levomenthol, blackcurrant flavor (Contains propylene glycol), carmoisine, patent blue V(E131)	Sore throat and blocked nose	Reckitt Benckiser healthcare Ltd.
4.	CLOTRIMAZOLE LOZENGE®	Clotrimazole	Croscarmellose Sodium Dextrates, magnesium stearate, Cellulose Microcrystalline, Povidone	Oral thrush	Perrigo company
5.	SUCRETS®	Dextromethorphan Hydrobromide	Corn Syrup, D&C Yellow 10, Hydrogenated Palm Oil, Menthol, N&A	Sore throat	Insight Pharmac

## CONCLUSIONS:

Lozenge is a medicated confection that was invented nearly the twentieth century and is still in manufacturing in today. The majority of the preparations are made using confectionery products and are very economical forms. They are made for both local and systemic effect. A wide range of functional items can be incorporated within their structure. Lozenges are in a position in the pharmacy and will continue to do so in the future.

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