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"A Comprehesive Overview Of Lozenges"

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Abstract:-

Lozenges are solid oral dosage forms designed to dissolve slowly in the mouth, offering local or systemic relief for various throat and mouth issues. They are commonly used to relieve sore throats, suppress coughs, and ease mouth irritation. Lozenges typically contain active ingredients such as menthol, benzocaine, honey, or herbal extracts, providing benefits like pain relief, soothing effects, antibacterial or antiviral properties, and freshening breath. They are particularly useful for individuals who have difficulty swallowing pills, such as children and the elderly. Lozenges improve patient compliance due to their ease of use, pleasant taste, and quick onset of action. However, while they help manage symptoms, they do not address the underlying causes of throat discomfort, like infections. Possible drawbacks include overuse, side effects from ingredients like menthol, and choking hazards, especially in young children. Despite these challenges, lozenges remain a popular and valuable treatment option, offering both relief and therapeutic effects in a convenient and user-friendly form.

Keywords: - Lozenges, oral dosage forms, throat relief, cough suppression, mouth irritation, active ingredients, menthol, benzocaine, herbal extracts, , swallowing difficulties, symptomatic relief, side effects, choking hazards, therapeutic effects.

Introduction:-

Oral drug delivery is the most preferred method for taking medications, and tablets are the most commonly used form. Solid dosage forms like tablets are popular because they are easy to take, provide an accurate dose, allow for self-medication, avoid pain, and, most importantly, improve patient compliance. However, one major issue many patients face with conventional tablets is difficulty swallowing. This problem is even worse when water is not easily available for taking the medicine. Dispersible tablets, which break down quickly, dissolve fast, and release the medication rapidly, help improve patient compliance. Difficulty swallowing (dysphagia) is a common problem across all age groups, especially in the elderly and children, due to changes in their bodies as they age. The word "lozenge" comes from the French word "lozenge," which refers to a diamond-shaped, four-sided figure. Lozenges and pastilles have been made in pharmacies since the 20th century and are still produced commercially. Although lozenges can last up to 30 minutes, this depends on the individual. They can be made by molding or compressing, depending on the type. Molded pastilles are one type of lozenge, while troches are compacted lozenges. Lozenges are solid substances that dissolve in the mouth or throat and are used to treat irritation or illness in the throat. They may contain one or more ingredients and are

usually made with a sweet or sugary base. They can also help drugs absorb into the body in a systematic way.

Lozenges are designed to provide a local effect on the throat, such as soothing or cooling it, and they sometimes help relieve coughs. When consumed, the patient can control how quickly the lozenge dissolves, which affects how much medication is released each time. Sucking on the lozenge can increase the amount of saliva in the mouth, which may dilute the medicine and affect its absorption. Lozenges are often used for patients who have trouble swallowing pills and are ideal for delivering drugs slowly in order to provide a continuous dose or to treat the throat. They can contain a variety of medicines such as pain relievers, sedatives, antihistamines, antiseptics, and more. If the medicine is absorbed through the mouth lining or swallowed, lozenges can have a systemic effect on the body.

Objectives:-

1. **Relief of Sore Throat and Cough**: Lozenges are often formulated to soothe irritated throat tissues and provide relief from coughs. This is achieved through ingredients like menthol, honey, or herbal extracts that coat and soothe the throat.
2. **Local Anesthetic Effect**: Many lozenges contain mild anesthetics like benzocaine or lidocaine to numb the throat temporarily, helping reduce pain or discomfort from sore throats, especially during swallowing.
3. **Antibacterial and Antiviral Action**: Certain lozenges contain antiseptic or antimicrobial agents (e.g., chlorhexidine or phenol) to help fight infections in the throat.
4. **Moisturizing and Hydrating the Throat**: Lozenges can help maintain moisture in the throat, which may be beneficial for dry, scratchy throats caused by air conditioning, dehydration, or other irritants.
5. **Loosening Phlegm**: Some lozenges contain ingredients like eucalyptus or menthol that can help break down mucus and relieve chest congestion.
6. **Enhancing Breath Freshness**: Lozenges often contain mint or other refreshing flavors to freshen the breath temporarily.

History:-

James Loftus was born in Lancaster, England, in 1842. In 1865, he opened his pharmacy in Fleetwood, a busy fishing port on the Flyte Coast. At that time, many fishermen working on the North Atlantic trawlers were suffering from breathing problems. Seeing an opportunity, James created a special strong medicine to help with these bronchial issues. It was a mixture of menthol, eucalyptus oil, capsicum, and liquorice that people could drop onto sugar cubes and suck on.

However, the glass bottles he used for the medicine weren't ideal for fishermen because the bottles often broke during rough seas. So, James decided to make the medicine in a solid form, like lozenges. He mixed the ingredients with sugar and gum, added water, rolled it out, cut it into shapes, and dried it in a hot air oven.

The lozenges became so popular that fishermen kept coming to his pharmacy asking for a bag of "fisherman’s lozenges." And that's how the famous name "Fisherman’s Friend" was born.

Types of lozenges:-

Type of Lozenges	Description	Common Uses
Medicated Lozenges	Contain active ingredients like menthol, benzocaine, or eucalyptus to treat sore throats, coughs, or mouth ulcers.	- Sore throat relief- Cough relief- Anesthetic for mouth ulcers
Herbal Lozenges	Made with plant-based ingredients like herbs, honey, and essential oils. Often used for soothing and calming effects.	- Soothing the throat- Relief from mild coughs and colds
Cough Lozenges	Specially formulated to provide relief from coughs, often containing menthol or honey.	- Cough suppression- Throat soothing
Throat Lozenges	Typically contain antiseptics or mild anesthetics like benzocaine or phenol for relief of throat irritation.	- Sore throat relief- Mild throat infections
Vitamin C Lozenges	Contain vitamin C (ascorbic acid) to boost immunity and prevent or treat colds.	- Immune support- Prevention of cold symptoms
Sugar-Free Lozenges	Lozenges that are sweetened with artificial sweeteners or sugar alcohols.	- Suitable for diabetics- Soothing for throat irritation
Cooling Lozenges	Contain menthol or peppermint for a cooling sensation to relieve throat discomfort.	- Throat relief- Refreshing cooling effect
Antiseptic Lozenges	Contain antiseptic agents like chlorhexidine or hexetidine to help prevent infections.	- Prevent and treat infections- Used in oral care
Flavored Lozenges	Available in a variety of flavors (e.g., cherry, lemon, mint) but may or may not contain active medicinal ingredients.	- Pleasant tasting- General throat soothing

Classification of Lozenges:

1. **According to the site of action:**
   - **Local effect:** These lozenges work where they are applied, like germicides or decongestants.
   - **Systemic impact:** These lozenges have effects throughout the body, like nutrients or nicotine.
2. **According to texture and composition:**
   - **Chewy or caramel-based medicated lozenges**
   - **Compressed tablet lozenges**
   - **Soft lozenges**
   - **Hard candy lozenges**

Chewy or Caramel-based Medicated Lozenges:-

These lozenges have medicine mixed into a caramel-like base. Instead of dissolving in the mouth, they are bitten into. They often have a natural taste, sometimes a little acidic to cover the taste of glycerin. These lozenges are especially useful for children and are a great way to deliver medicine for digestion or general use. A common example is the chewy or "sticky" candy lozenges, which are made by pouring the mixture into molds or spreading it out to dry into a uniform shape.

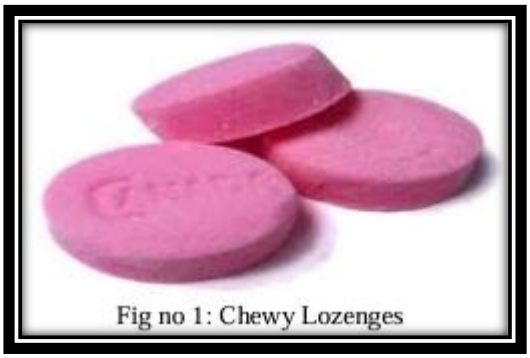

Fig no 1: Chewy Lozenges

Compressed tablet lozenges:-

Compressed tablet lozenges are used when a drug is sensitive to heat and cannot be processed through traditional methods. The manufacturing process is similar to that of regular tablets, but lozenges differ in some key ways. They have different organoleptic properties, meaning they may taste or feel different in the mouth. Lozenge tablets also do not disintegrate as easily as traditional tablets and have a slower dissolution profile. The lozenge is made with heavy compression equipment, which makes it harder than regular tablets. This hardness is desirable because it allows the lozenge to dissolve slowly in the mouth, providing a prolonged effect.

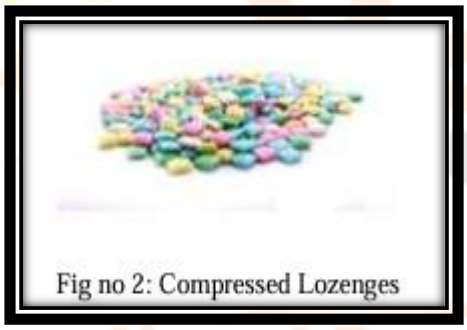

Fig no 2: Compressed Lozenges

Soft lozenges:-

Soft lozenges are popular because they are easy to make and can be used for many types of medicines. These lozenges are usually made from a mix of polyethylene glycols, acacia, or similar materials. One type of soft lozenge is the pastille, which is a soft, usually clear, tablet made with medicine in a base of gelatin, glycerogelatin, or acacia and sucrose. Soft lozenges are similar to a traditional form of medicine, but they're making a comeback as a "candy" version. These "candies" are sweet, soft lumps that contain medicine. The popularity of soft lozenges today is mainly due to the use of polymers like polyethylene glycols as the base for the dosage form. They are easy to use, convenient to carry, simple to store at room temperature, and generally taste good. However, polyethylene glycol-based lozenges can absorb moisture and may soften if exposed to high temperatures.

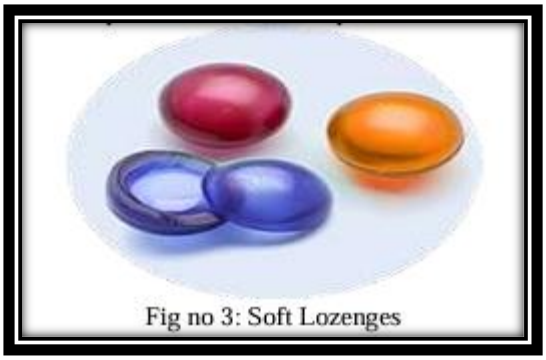

Fig no 3: Soft Lozenges

Hard candy lozenges:-

Hard candy lozenges are made by combining sugar and other starches in a solid form, either as a smooth or crystal-like structure. They can also be considered solid syrups made of sugar. The moisture content and weight of hard candy lozenges should be between 0.5 to 1.5% moisture and 1.5 to 4.5 grams, respectively. These lozenges should dissolve slowly and evenly over 5 to 10 minutes without breaking down too quickly. Since their production requires high temperatures, heat-sensitive ingredients cannot be included in these lozenges. They are typically made by heating and then cooling the mixture.

Fig no 4: Hard Lozenges

Methodology:-

Formulation: Soft lozenges were made using the melting and molding method. Jaggery was melted in a water bath and then mixed with other powdered ingredients to create a smooth, even mixture.

Table 1: Formula taken to form herbal lozenges

S. No.	Ingredients	Quantity for one lozenge
1	*Piper nigrum*	125 mg
2	*Glycyrhiza glabra*	200 mg
3	Jaggery q. s.	10 gms

Macroscopical evaluation:-The formulation developed in the lab was tested to see how well it was accepted. This was done by visually observing its appearance and checking different sensory qualities, like color, texture, and overall look, to evaluate how it might be perceived by users.

Table 2: Macroscopic evaluation of formulated lozenges

S. No.	Parameter	Observation
1	Colour	Golden Yellow
2	Odour	Pleasant
3	Taste	Sweet
4	Texture	Smooth
5	Shape	Oval

Determination of ash values: The total ash method is used to determine the amount of material left after burning a plant sample. When the sample is ignited, everything that doesn't burn is left behind as ash. This ash is made up of two types of substances. The first type is **physiological ash**, which comes from the plant's own tissue and includes minerals and other natural components present in the plant. The second type is **non-physiological ash**, which consists of foreign matter like sand, dust, or soil that might have been attached to the plant's surface. By measuring the total ash, we can understand both the minerals within the plant and any external particles that might have been mixed in.

Table 3: Determination of total ash value

S.No.	Drugs	Total ash (% w/w)
1	*Pipper longum*	1.5
2	*Glycerhhiza glabra*	3
3	*Lozenges*	6.3

Determination of swelling index:

The swelling index measures how much space (in milliliters) 1 gram of herbal material occupies when it swells under certain conditions. To determine it, you add water or another swelling agent to the herbal material, following specific instructions for each type of herb. The change in volume that occurs as the material swells is what helps calculate the swelling index.

Table 4: Determination of swelling index

S.No.	Drugs	Swelling index
1	*Pipper longum*	NIL
2	*Glycerhhiza glabra*	NIL
3	*Lozenges*	NIL

Determination of moisture content:

This test is used to find out how much water is in a material by drying a sample until its weight stays the same at a set temperature. To calculate the moisture content of the mixture, a measured amount of the mixture is dried in a hot air oven at 120°C until it reaches a constant weight, and then the percentage of moisture is calculated.

Table 5: Determination of moisture content

S.No.	Dosage form	Moisture content
1	Lozenges	4.35%

Determination of extractable matter:

This method measures how much of the active ingredients are extracted from herbal material using solvents. It is used when there is no suitable chemical or biological test available for the material. The extractive values are determined following the procedure outlined in the WHO guidelines.

Table 6: Determination of extractive values

S.No.	Drugs	Water extractive value	Alcohol extractive value
1	*Pipper longum*	4.458% w/v	0.811% w/v
2	*Glycerhhiza glabra*	4.103% w/v	1.207% w/v
3	*Lozenges*	0.124% w/v	-

Thin-layer chromatography:

Thin-layer chromatography (TLC) is a useful method for identifying small amounts of impurities in substances. This technique is explained in detail in the international pharmacopoeia, which is a recognized set of standards for medicines. TLC is especially helpful in the pharmaceutical field because it is simple to perform, requires minimal equipment, and is cost-effective. Because of these advantages, TLC is commonly used to analyze herbal materials and the products made from them. The process

involves separating the components of a mixture on a thin layer of material, allowing scientists to see and identify different compounds present in the sample.

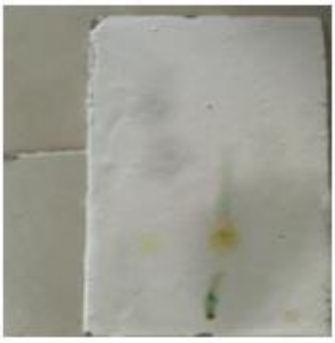

Figure 1: Thin Layer chromatography

Table 7: Thin Layer Chromatography

S.No.	TLC	Rf value
1	Pure	0.934
2	*Lozenges*	0.958

Examples of formulation:-

1. Hard lozenges:-

Formula for 30 Lozenges:-

Ingredient	Amount
Drug	1 gram
Powdered Sugar	42 grams
Corn Syrup	16 grams
Water	24 ml
Mint Extract	1.2 ml
Color	As needed

2. Soft lozenges:-

Formula for 10 lozenges:-

Ingredient	Amount
Drug	1 gram
Polyethylene Glycol 1000	10 grams
Aspartame	20 grams
Mint Extracts	1 milliliter
Color	(q.s.)

ADVANTAGES:

Lozenges are solid, flavored tablets designed to dissolve slowly in the mouth, delivering therapeutic agents locally or systemically. They offer several advantages:

- **Enhanced Bioavailability**: Lozenges increase the retention time of the active ingredient in the oral cavity, improving absorption and bioavailability.
- **Reduced Gastric Irritation**: By dissolving in the mouth, lozenges minimize direct contact with the stomach lining, thereby reducing the risk of gastric irritation.
- **Bypassing First-Pass Metabolism**: Lozenges allow certain drugs to enter the systemic circulation directly through the oral mucosa, avoiding the first-pass effect of the liver, which can metabolize the drug before it reaches systemic circulation.
- **Ease of Administration**: Lozenges are particularly suitable for patients who have difficulty swallowing pills, such as pediatric or geriatric populations, providing a palatable and convenient dosage form.
- **Rapid Onset of Action**: The slow dissolution of lozenges in the mouth leads to quick release and absorption of the active ingredient, resulting in a rapid onset of therapeutic effects.
- **Improved Patient Compliance**: The pleasant taste and ease of use of lozenges can enhance patient adherence to treatment regimens.

DIS-ADVANTAGES:

Lozenges, while popular for soothing sore throats and providing relief for coughing or dry mouth, also have a few potential disadvantages. Here are some of the main drawbacks:

1. **Overuse and Side Effects**

- **Sugar content:** Many lozenges contain a significant amount of sugar, which can contribute to weight gain, tooth decay, and other health issues if consumed in large quantities.
- **Excessive use can lead to side effects:** For example, lozenges with menthol or eucalyptus might cause throat irritation, digestive issues, or a burning sensation in the mouth or throat when used excessively.
- **Risk of choking:** Lozenges are typically small, and there is a risk of choking, particularly for children, if they are not consumed properly.

2. **Limited Effectiveness**

- Lozenges can provide temporary relief from throat irritation, but they don't address the underlying cause of symptoms, such as infections or other medical conditions. So, the relief might only be short-term without further medical intervention.
- **Mild pain relief:** While they may help soothe a sore throat, lozenges often don't provide strong analgesic effects compared to other medications like ibuprofen or acetaminophen.

3. **Unpleasant Taste or Aftertaste**

- Some lozenges, particularly those with menthol or other medicinal ingredients, can have a strong, unpleasant taste or aftertaste, which can be off-putting for some individuals.

4. **Potential Allergic Reactions**

- Some lozenges contain herbal ingredients or other compounds that could trigger allergic reactions in sensitive individuals. For example, lozenges containing honey or certain flavorings might not be suitable for people with allergies.

5. **Not Suitable for All Age Groups**

- Lozenges are generally not recommended for young children, as there is a risk of choking. Children under the age of 4 are particularly at risk, and even for older children, lozenges should only be used under adult supervision.

6. **Drug Interactions**

- Some lozenges, especially those containing medicinal ingredients like menthol, eucalyptus, or dextromethorphan (a common cough suppressant), could interact with other medications. This could result in unwanted side effects or reduce the effectiveness of other treatments.

Application:-

Antifungal Lozenges: These lozenges, like clotrimazole and nystatin, are used to treat fungal infections in the mouth.

Nicotine Lozenges: Nicotine lozenges help people quit smoking. When you suck on them, nicotine is released into your bloodstream. They can be used as needed to stop smoking cravings.

Zinc Lozenges: Zinc is good for fighting infections, and when it's in lozenges, it may help reduce the length and symptoms of a cold. However, some studies are not clear on how effective this is.

Throat/Cough Lozenges: Lozenges for sore throats often have a numbing ingredient like benzocaine to temporarily relieve pain. Some also contain antibiotics to treat throat infections like strep. Cough lozenges may have ingredients like menthol or eucalyptus to help reduce coughing.

Erectile Dysfunction Lozenges: There are lozenges for treating erectile dysfunction. They're taken about 30 minutes before sex and have fewer side effects than tablets.

Morning Sickness Lozenges: Prenatal lozenges with vitamin B6 (pyridoxine) can help reduce nausea and vomiting during pregnancy. However, they should only be used as directed by your doctor, since too much B6 can cause issues for your baby.

CONCLUSION:-

In conclusion, lozenges are a convenient and effective oral medication for easing throat discomfort, coughing, and mouth irritation. They provide localized or even systemic effects, making them ideal for individuals who have difficulty swallowing tablets. Lozenges can contain various active ingredients, such as menthol, antiseptics, or herbal extracts, offering benefits like soothing relief, pain reduction, and fresher breath. Although they are easy to use and improve patient adherence to treatment, lozenges do have some limitations, such as the risk of overuse, potential side effects, and their limited ability to address underlying health issues. Despite these drawbacks, lozenges remain a popular and valuable treatment option in both medicinal and over-the-counter forms.

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