

Utilization of Polyherbal Drug to Formulate Lozenges for Treatment of Various Disease

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Abstract: In order to prevent and treat a wide range of illnesses and problems, traditional medicine and herbal remedies have been employed by mankind. Humans have been using natural resources as remedies for as long as anybody can remember. According to the Indian System of Medicine, Ayurveda, Siddha, and Unani plants are prepared in various dose forms, such as churna, gutika, asavas, and aristasavlehas, among others. In this study, we have talked about innovative dose forms such lozenges. Boost the dosage form's time remaining in the oral cavity while keeping in mind the need of patient compliance. This will increase bioavailability, lessen gastrointestinal discomfort, and avoid first pass metabolism. This dosage form can be used for both local and systemic therapy, and a variety of active ingredients may be added to them. The focus of this review was on herbal lozenges, which are used to treat several illnesses. Compared to synthetic drugs, herbal medicines are safer, easier to obtain, and have less adverse effects.

Keyword: - Lozenges, Herbal medicine, Synthetic medicine, Medicament

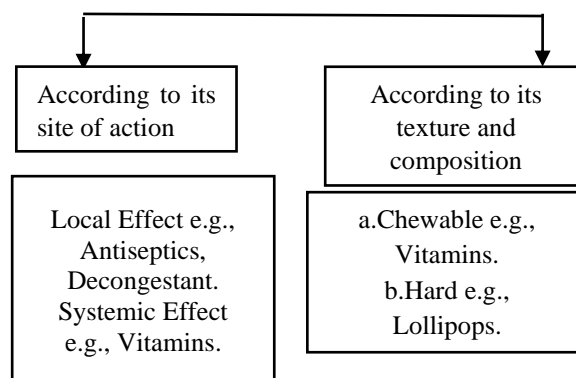
I INTRODUCTION

The word "Lozenge" is derived from French word "Losenge" which denotes a diamond-shaped geometry with four equal sides, is the origin of an English word "Lozenge." Since about the 20th century, pharmacies have developed lozenges and pastilles, which are still produced for sale.

"Lozenges are solid dosage forms that contain flavouring and sweetening ingredients, to dissolve or disintegrate slowly in the mouth or oral cavity". They are most commonly implemented for local actions in the oral cavity, and if they are well absorbed in the buccal lining and pharynx, they may also have systemic effects. "Lozenges slowly release the medication into the buccal cavity in order to produce the desired amount of medication. Lozenges may contain a variety of herbal and artificial medications or substances.

A dosage form made up of one or more herbs or their derivatives is known as a natural medicine formulation. It comprises active herbal ingredients, herbal preparations, or a combination of the two. It can be produced by subjecting natural ingredients to specific processes including extraction, distillation, fractionation, or fermentation [16]. Traditional medicine's herbal formulations are distinguished by the use of one or more herbs in each formula. Even though synthetic medications have a stronger pharmacological impact and a quicker onset of action, they are more expensive and cause a lot of undesirable side effects. As a result, the general public is currently returning to using natural medicines.

TYPES OF LOZENGES: - (2)



A. CHEWABLE LOZENGES: [3]

Since the medication is mixed into the caramel foundation of chewable lozenges rather than being dissolved in the mouth, chewing them is the preferred method of administration. These lozenges are made with 70% glycerin, 20% gelatin, and 10% water. Chewable lozenges are an oral dosage form that should be consumed by the patient after being chewed, as opposed to being swallowed whole.

B. HARD LOZENGES:

These lozenges are made of a sugar and carbohydrate blend. They typically exist in amorphous or glassy states and are not crystalline in

nature. They are also known as "sugar syrups". Hard candy lozenges typically weigh between 1.5 and 4.5 grammes. To enhance bioavailability, reduce gastrointestinal discomfort, and avoid first pass metabolism, prolong the time the dose form is retained in the oral cavity.

C. SOFT LOZENGES:

Made of components such as PEG (polyethylene glycol), chocolate, or acacia base, soft lozenges are designed to release drugs into the mouth gradually. Due to its simplicity in unexpected preparation and adaptability to a wide range of medications, soft lozenges have gained popularity.

D.COMPRESSED LOZENGES:

It is not possible to formulate heat-sensitive ingredients, also known as heat-labile ingredients, using the same process as for soft or hard lozenges. For these kinds of components, the compression process is simply appropriate, just like with compressed tablets. The main distinction between them is a slower and non-disintegrating disintegration profile. In compressed lozenges, the granulation technique is applied. A compressed lozenge pill can be created from thermolabile medications. Lozenge tablets are made using the same granulation process as regular compressed tablets. The compressed lozenge is sufficiently hard so that it dissolves gradually in the mouth.

II. FORMULATION OF LOZENGES: - (2)

The raw materials used in medicated lozenges contain sugar, corn syrup, acidulant, colorant, flavour, and the medicament.

Table I- Formulation Consideration

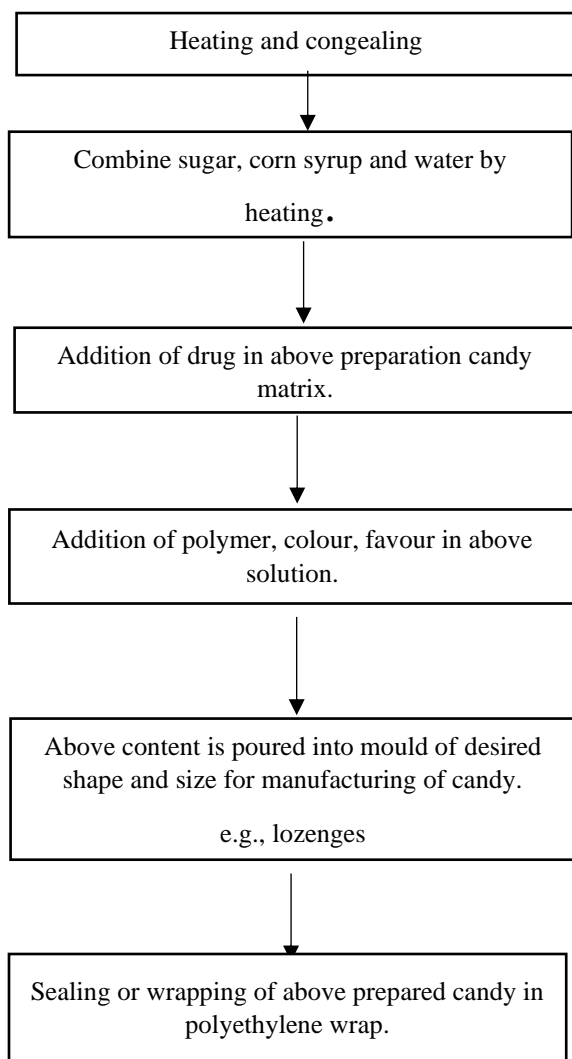
INGREDIENT	EXAMPLE
Candy base a. Sugar. b. Sugar free vehicle. c. Fillers.	Lactose, Maltose, Sucrose, Dextrose. Mannitol, Sorbitol, Polyethylene glycol. Di- calcium phosphate, Calcium sulphate, Calcium carbonate, Microcrystalline cellulose.
Lubricants	Magnesium stearate, Calcium stearate, Stearic acid, PEG, Vegetable oils, Fats.
Binders	Acacia, Corn syrup, Sugar syrup, Gelatin, Polyvinyl

	pyrrolidone, Tragacanth, Methyl cellulose.
Colouring agent	Water soluble and lakolene dyes, Colors, Orange colors paste, red colors cubes etc.
Flavouring agent	Menthol, Eucalyptus oil, Spearmint, Cherry flavour, etc.
Whipping agent	Milk protein, Egg albumin, gelatin, Xanthan gum, Starch, Pectin, Algin, Carrageenan.
Humectant	Glycerin, Propylene glycol, Sorbitol.

**III.METHOD OF PREPRATION LOZENGES: -
(Hard Lozenges). (4)**

Hard candy lozenges are amorphous (non-crystalline) or glassy combinations of sugar and other carbohydrates. These can be regarded as solid sugar and starch syrups. In the past, lozenges have been widely utilised to deliver topical anaesthetics and antibiotics while also providing temporary relief from minor sore throat pain and irritation. They typically range from 0.5 to 1.5% in moisture content. Hard lozenges should have a smooth surface texture, a slow, uniform disintegration or erosion over 5 to 10 minutes, not disintegrate, and a flavour that is pleasing but conceals the taste of the medication. The need for a high temperature during the manufacturing of hard candy lozenges is one of their main drawbacks. The typical weight range for hard candy lozenges is 1.5 to 4.5 gm. Excipients with demulcent properties, like sorbitol and sugar, ease the pain of irritated tissue caused by coughing and sore throats.

All hard candy-style lozenges ultimately go gritty, but how quickly depends on the substances that are utilised. Adding corn syrup solids at a concentration of more over 50% reduces the graining tendencies, but they can also lead to increased moisture absorption, which makes the product stickier and causes drug problems. Graining and crystallisation speed tend to increase when sucrose solids are used at levels greater than 70%. The formulations that offer the best balance of resistance to graining, decreased moisture absorption, and reasonable preparation time typically contain between 55 and 65% sugar and 35 to 45% corn syrup solids.



SOFT LOZENGES: - (19)

The "confection," a former pharmaceutical kind that is making a comeback, is comparable to soft lozenges. The term "confections" refers to highly saccharinated, soft masses that contain pharmaceuticals. Polymers (Polyethylene Glycols) are used as the dosage form's matrix, which has improved their current use significantly. In general, they have good flavours and are simple to use, carry, store, and keep at room temperature. Lozenges made of polyethylene glycol may have a tendency to be hygroscopic and may soften in hot environments. Therefore, it is advised to store in a cold, dry location.

The delicate texture of these lozenges allows for either hand rolling and cutting into pieces or pouring the heated bulk into a plastic mould. Using PEG requires overfilling the mould cavity because PEGs shrink as they cool. Chocolate does not shrink, so this is not necessary.

IV. LITERATURE SEARCH ON PREPARATION OF LOZENGES BY USING POLYHERBAL DRUG

D. M. Kannur et.al In the current investigation, different polyherbal lozenge formulations were created to completely eliminate all cold and flu symptoms. Herbs like liquorice, clove, ginger, long pepper, guduchi, and turmeric were used in these experiments. Conclude that prepared lozenges are completely herbal, have no synthetic ingredients, and are cost-effective for treating all cold and flu symptoms. (6)

Kamlendra Kumar Mishra et al., a chronic throat infection can cause cancer as well as serious throat conditions including pharyngitis. This study came to the conclusion that soft lozenges, which can be used to treat mild throat infections in their early stages, can be simply made from common home ingredients like pepper, glycerine, and jaggery. (7)

Kesha Desai and et.al. The goal of the current study is to create herbal lozenges for the treatment of RAS (recurrent aphthous stomatitis) that act effectively locally and have high patient compliance. using a variety of herbal medications, including liquorice and catechu extract. The antioxidant activity that catechu extract exhibits due to the tannin concentration was an interesting finding. It aids in avoiding cell damage. Liquorice contains tannin as well. Using an in vitro model, it also demonstrated the antioxidant activity of Glycyrrhiza glabra Linn. root extract. As a result, both medications have an astringent effect. A synergistic impact is thereby produced when the two medications are combined. This increases the likelihood that their ulcer healing will play a role. (8)

Binu Anand and others the purpose of this study was to formulate the lozenge pills, extract Coleus aromaticus oil and eucalyptus oil, and research a viable dosage form. The prepared product demonstrated inhibitory effectiveness against non-resistant C. albicans infections, offering an excellent release matrix for the combined extract of eucalyptus and coleus aromaticus. The outcomes clearly show that prepared lozenge tablets can be an excellent replacement for conventional forms. (9)

Vijaysri Kadirvel et.al This study aims to create lozenges using traditional ingredients including Adhatoda vasica, Althaea officinalis, Glycyrrhiza glabra, and Trachyspermum ammi, which have bioactive chemicals that can be used to cure sore throats. The FTIR study revealed the existence of

functional groups in *Adhatoda vasica*, which is the main source of the targeted bioactive chemicals vasicine and vasicinone. As a result of the study mentioned above, it is suggested that the developed product successfully suppress sore throats. (10)

C. Goda et al. The current work's goal is to create and assess lozenges containing potassium salt curcumin extract for their anticancer properties and ability to deliver medication into the buccal cavity. The formulation was stable, according to stability studies. When compared to curcumin and other common anticancer medications like 5-Fu, Mito-C, and Paclitaxel, potassium curcumin had the strongest anticancer efficacy, showing 85% against prostate cancer cells, 80% against liver cancer cells, and an average of 92% against colon cancer cells. It was determined from the results of the current study that lozenges containing the potassium salt of curcumin can be used as an effective delivery method for the treatment of various cancers. (11)

Savita Parit and et.al In the current investigation, extracts of plants with demonstrated antidiabetic potential were used to make medicated compressed tablet lozenges. Antioxidant and phytochemical potential in the hydro-alcoholic herbal extract of *Acacia arabica* was examined. The main benefit of using medicinal lozenges is the longer dose form holding time in the oral cavity. This results in improved bioavailability and less gastric irritation and bypass.

Dhoke, Pooja S., et al. The two main medicinal plants that are used in this study are *Tejpatta* (*Cinnamomum tamala*) and *Akarkara* (*Spilanthes acmella*), both of which are abundant in therapeutic ingredients. The selected microorganism can be treated using the antibacterial activities of *Spilanthes acmella* flowers and *Cinnamomum tamala* leaf extracts (*staphylococcus aureus*, *Streptococcus mutans* and *Escherichia coli*). (12)

Putriana, Norisca Aliza, et.al In this study, wet granulation was used to create lozenges containing black garlic extract as an antioxidant supplement. The goal was to create the best formula possible. Utilizing two-level factorial methodology and statistical analysis, professional design software was used to optimise the formula. The most desirable formula, F2, has a desirability value of 0.922 and is made from gum arabic and starch pregelatin in a 3:5 ratio.

Thitya Luetragoon et.al medical plants with anti-inflammatory properties, such *Moringa oleifera* Lam. (MO) and *Cyanthillium cinereum* (Less.) H.

Rob. (CC), may benefit smokers' dental health. According to this study, lozenges containing *Cyanthillium* and *Moringa* extracts together showed a potent pharmacological effect in reducing gingivitis and oral inflammation in non-smokers. This in vivo study showed that *Cyanthillium* and *Moringa* medicinal plant extracts are safe for people and could be utilised to enhance dental care, particularly in smokers with high rates of gingivitis and periodontitis. (13)

Following table give the information related to herbal drug and their diseases /activity.

Table II- Polyherbal drug to treat various disease.

Herbal drug	Diseases/ Activity.
1. Liquorice, Clove, Ginger, Long pepper, Guduchi and Turmeric.	Cold and Flu.
2. Pippur longum, Glycyrrhiza glabra and Jaggery.	Throat infections (Pharyngitis).
3. Liquorice and catechu extract.	RAS (recurrent aphthous stomatitis).
4. Eucalyptus oil and Coleus aromaticus oil.	Oral or vaginal candidiasis, and life-threatening systemic infections.
5. <i>Adhatoda vasica</i> , <i>Althaea officinalis</i> , <i>Glycyrrhiza glabra</i> , and <i>Trachyspermum ammi</i> .	Sore throat infection.
6. Potassium salt of curcumin extract	Cancer.
7. <i>Acacia arabica</i> .	Antidiabetic.
9. <i>Tejpatta</i> (<i>Cinnamomum tamala</i>) and <i>Akarkara</i> (<i>Spilanthes acmella</i>).	Antibacterial activity.
10. Black garlic extract.	Antioxidant supplement.
11. <i>Moringa oleifera</i> Lam. (MO) and <i>Cyanthillium cinereum</i> (Less.) H. Rob. (CC).	Gingivitis and periodontitis.

V. QUALITY CONTROL TEST LOZENGES

Candy base (5)

These are used to test a number of variables, including corn syrup, sugar supply equipment,

temperature, steam pressure, and vacuum of candy base cookers.

Moisture Analysis (5)

The moisture content of lozenges is measured using the gravimetric, Karl Fisher titration, and azeotropic distillation methods. The gravimetric approach involves weighing the sample (1g) and placing it in a vacuum oven at 60–70°C for 12–16 hours. Calculating the difference in moisture content requires subtracting the final weight from the initial weight. In order to do a Karl Fischer titration, a sample must be calculated to contain 10-250 mg of water in a titration flask. In the azeotropic distillation process, 10–12g of candies are crushed and put in a 500ml flask with 150–200ml of toluene. The flask is attached to a reflux condenser and refluxed for one to two hours. The amount of water found in the sample is determined by the water collected.

Determination of Sugar and Corn Syrup Ratios (5)

This is performed by "Dextrose equivalent method and Lane Eynon Titration method.

Determination of Percentage of Reducing Sugars

500 ml of water is used to dissolve 3g of anhydrous dextrose, and 2 drops of methylene blue are added. The mixture is then heated for 2 minutes, and the result is yellowish red when titrated against 25 ml of Fehling solution.

$$\text{Percentage reducing sugar} = \left(\frac{\text{Reducing sugar factors} \times 100}{\text{Sample weight} / 250 \times \text{Volume of sample solution consumed by Fehling's solution}} \right)$$

Physical And Chemical Testing: (14)

Diameter and thickness-

The uniformity of lozenges depends on their thickness and diameter. Vernier callipers can be used to determine it. The diameter of lozenges may not exceed 5% of the average value in any direction.

Hardness- Depending on the hardness, lozenges' resistance to handling, storage conditions, transportation, and breakage. So, it becomes important to evaluate hardness in order to determine its threshold capacity, which may be done with a Monsanto hardness tester and expressed in kilogrammes per square metre (kg/cm²).

Weight variation- 20 lozenges are weighed individually for the USP weight variation test, and the results are compared as follows.

$$\text{Weight variation} = \frac{\text{average weight} - \text{initial weight}}{\text{average weight}}$$

Friability- Friability tests are conducted for the same purpose as hardness tests. The Roche Friabilator is used for friability testing, and it is run at a given speed for a specified amount of time, such 25 rpm for 4 minutes.

In-vitro drug release- Dissolving testing, commonly known as in-vitro drug release, is done using a USP-II paddle-style dissolution equipment.

Microbial Check on Lozenges (14)

In this microbiological check, the presence of any bacterial, mould, or spore contamination is examined in raw materials, completed goods, machinery, cooling tunnels, environmental conditions, and storage drums. The following counts should be performed as part of laboratory microbiological testing: total plate, total coliform, yeast and mould, E. coli, Staphylococcus, and Salmonella.

Stability Testing: - (14)

Lozenges must undergo stability testing prior to packing. The following circumstances are used when carrying lozenges for stability testing.

1 to 2 months at 60 °C. 1 to 3 months at 45 °C.

9–12 weeks at 37 °C. 36–60 months between 4°C and 25°C.

2. Testing the stability of lozenges following packing

Lozenges are transported for stability testing after final packaging under the specified circumstances.

6–12 months at 25°C and 80%RH.

3 months at 37°C and 80%RH.

25°C at 7

Packaging: - (5)

Given the hygroscopic nature of the lozenges, a complicated and multi-layered packaging is used. The individual component is wrapped in polymeric moisture barrier material, which is then placed in a tightly sealed glass, polyvinyl chloride, or metal container and overwrapped with aluminium foil or cellophane membrane.

Storage: - (5)

Lozenges should be kept out of children's reach and away from heat. Extreme humidity should be kept away from them. Either ambient temperature refrigerator temperature is typically recommended, depending on the storage needs of the base and the medicine.

List of various marketed formulation: Various herbal formulation available in market which having lot of use in particular disease.

Table III Marketed polyherbal Lozenges and Their Ingredients

Marketed lozenges	Main ingredient.	Use
Throat Lozenges.	STRATOL	Mouth and throat infections.
Koflet-H lozenge.	Ginger	cough, sore throat and quickly relieves throat irritation.
PTOTFER lozenges	Turmeric	Heart diseases and cancer
Alex Cough Lozenges	Ginger	Treatment of dry cough
Multani Kuka Cough Lozenges.	Tulsi Ginger	Use in cough
Orac-99k Turmeric Lozenges.	Turmeric	Combat cancer stem cells Reduce anti-inflammatory Protect against the ravages of aging. Inhibit the formation of LDL (bad) cholesterol
IMC Shri Tulsi Lozenges.	Aloe Vera, Tulsi and Mulethi.	Provides relief from bronchitis, irritable cough, throat irritation.
Lexicof Herbal Cough Lozenges.	Mint, Strawberry.	Cough.
SOOTHIST lozenges.	Honey Ginger	Sore Throat
Amrut Tulsi Lozenges.	Ginger Mint.	Sore Throat, Laryngitis & Cough Suppressant.
Healtuss cough lozenges.	Orange, Ginger Lemon, Honey Lemon.	Smoothing relief from sore cough.

VI REGULATION GUIDELINE FOR LOZENGES

The Sectional Committee in charge of creating the Indian standard IS 11668-1975 took into account the methods currently used in India for making lozenges as well as the information that was available regarding their composition. The standard was first released in 1960. Its initial revision was made in 1972. This standard provides recommendations regarding the components and their requirements, the hygienic state of the product, and the packing material. If the product is wrapped, it must be in cellulose film, waxed paper, aluminium foil, polyethylene, or another flexible packaging material that is plain or printed. Also include a labelling

standard. The Drugs and Cosmetics Rules of 1945 and Title 21 of the Code of Federal Regulations both contain labelling requirements in Section 96. After acquiring a conformity standards certificate from BSTI, lozenges may be imported (Bangladesh Standards and Testing Institution). Food Standards and Safety (Food Products Standards and Food Additives) Regulations, it provides guidelines for what flavouring and colouring ingredients should be used to lozenges.

VII.CONCLUSION

The emphasis of the current review is the creation of polyherbal lozenges, which offer a number of advantages over synthetic drugs, including being more readily available, less expensive, and being significant contributors to the varied pharmacological action. In addition to masking the bitterness of most medications and their prolonged action, lozenges are simple to administer to youngsters and elderly patients. There are many benefits, such as patient compliance, comfortable and effective treatment, rapid onset of action, low dose, shortened dose regimen, and affordability. Lozenges play a significant role in pharmacy, have achieved great success in this industry, and will continue to hold this position in the future.

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