

Formulation and Evaluation of Medicated Lozenges Using Ornamental and Traditional Herbs to Treat Sore Throat Infection

S. REVATHI^{*1}, J. KALAIMATHI², J. DEENA MOL³, S. KALPHANA⁴, S. KEERTHANA⁵ and R. KARTHIKA⁶

¹⁻⁶ Department of Biochemistry, Theivanai Ammal College for Women (Autonomous), Affiliated to Annamalai University, Villupuram - 605 602, Tamil Nadu, India

Received: 23 Oct 2023; Revised accepted: 01 Dec 2023; Published online: 21 Dec 2023

Abstract

Lozenges are medicinal sweets used to treat painful throat infections that include one or more active substances. The lozenges dissolve in the mouth to moisten and soothe the irritated throat. The primary purpose of these pharmaceutical lozenges was to prevent throat infections like strep throat, throat itching, and painful throat. This research intends to formulate lozenges by using traditional ingredients such as the Cypress vine (*Ipomoea quamoclit*), Mexican mint (*Coleus amboinicus*), Holy basil (*Ocimum tenuiflorum*), clove (*Solanum aromaticum*), Solanum Trilobatum (*Solanum procumbens*), liquorice powder (*Glycyrrhiza glabra*), and ginger paste (*Zingiber officinale*). The formulated lozenges were evaluated for taste, flavour, thickness, weight variation, pH, and characterized by FTIR analysis. The present study demonstrated that the medicated lozenge can be used as a delivery method for the treatment of sore throat and associated infections.

Key words: Lozenges, Cypress vine, Sore throat, Holybasil, cloves, Mexican mint, *Solanum trilobatum*, Ginger, Streptococcus pyogenes

A lozenge is a solid dosage form designed to melt or dissolve slowly in the mouth. They contain one or more active ingredients which are flavored and sweetened so as to be pleasant tasting. These are usually used for local effects, but may contain ingredients that have systemic effects. A throat lozenge (also known as cough drop, sore throat, sweet or cough sweet) is a small, typically medicated tablet intended to dissolve slowly in mouth to temporarily stop cough, lubricate and soothe irritated tissue of the throat (usually due to a sore throat or strep throat), possible from the common cold or influenza. Sore throat is typically caused by viral, bacterial, or fungal infection. The microscopic organism that most normally causes sore throat is streptococci. Lozenges were historically used to relieve minor sore throats and inflammations, and were often used to administer local anaesthetics and antibiotics [2].

Lozenges are said to have local effects on the throat, such as cooling the throat and gurgling. May relieve cough by ingesting lozenges, patients can control the rate of excretion and absorption until they are completely dissolved. Lozenges are intended for patients who cannot swallow solid oral dosage forms of drugs, and for slow release to administer drugs continuously into the mouth, or to cleanse the throat tissue with a liquid. Used in medicine [6].

Throat lozenges contain narcotics such as benzocaine. Soothes the throat. Anaesthetics work by temporarily paralyzing the affected area. Feel safe. Some throat lozenges may also contain antibiotics to treat throat problems, including strep throat. Cough lozenges that suppress coughs may contain ingredients. Examples: Menthol and Eucalyptus: Sore throat

lozenges contain anaesthetics. B. Benzocaine Soothes the throat. Some throat lozenges may also contain antibiotics to treat throat problems. Including strep throat. Cough lozenges that suppress coughs may contain ingredients such as menthol and eucalyptus [1].

Herbs are plants or parts of plants that are used for their therapeutic effect, taste, or aroma. As herbal medicines are a type of dietary supplement, they are sold in a variety of dosage forms including tablets, capsules, powders, tea bags, solid extracts, and sometimes fresh and dried plants. People use herbal medicines to maintain or improve their overall health. That's why we offer natural lozenges containing natural medicinal plants (liquorice, holy basil, Mexican mint, eggplant, ginger, cloves) and ornamental plants such as cypress, which is used as the main botanical in sore throat lozenges [7].

MATERIALS AND METHODS

Ingredients quantity

Table 2 Ingredients quantity of medicated lozenges

Components	Quantity
Cypress vine juice	2ml
Glycyrrhiza glabra paste	1g
Holy Basil juice	1ml
Mexican mint juice	1ml
Solanum trilobatum juice	1ml
Ginger paste	1g
Sugar	1/2kg
Honey	1 teaspoon

*Correspondence to: S. Revathi, E-mail: revkarthi85@gmail.com; Tel: +91 7708776166








Citation: Revathi S, Kalaimathi J, Mol JD, Kalphana S, Keerthana S, Karthika R. 2023. Formulation and evaluation of medicated lozenges using ornamental and traditional herbs to treat sore throat infection. *Res. Jr. Agril. Sci.* 14(6): 1978-1980.

Cloves juice	1ml
Lemon juice	1ml

Instrumentation analysis for lozenges
Fourier transform infrared spectroscopy

Fourier Transform Infrared Spectroscopy or FTIR Spectroscopy is an analytical technique used to identify organic, polymeric, and, in some cases, inorganic materials. The FTIR analysis technique scans a test sample and analyses its chemical composition using infrared light [4].

Table 1 Details of Medicated lozenges

Constituents [8]	Biological source [8]	Family	Uses [8]	Images
Cypress vine (<i>Ipomoea quamoclit</i>)	Thin leaves of Cypress vine	Convolvulaceae	To treat sore throat, cracks, throat pain, vocal disorders and throat related ailments	
Liquorice (<i>Glycyrrhiza glabra</i>)	Main root of the liquorice in a powder form	Faboideae	To sore throat, cough, irritation of throat	
Holy basil (<i>Ocimum tenuiflorum</i>)	Leaves of the holy basil	Lamiaceae	To treat common cold and sore throat	
Mexican mint (<i>Coleus amboinicus</i>)	Leaves of the mint	Lamiaceae	To treat cough, cold, sore throat, and asthma	
Solanum Trilobatum (<i>Solanum procumbens</i>)	Leaves of the solanum trilobatum	Solanaceae	To treat cold, cough, asthma, lung diseases	
Ginger (<i>Zingiber officinale</i>)	Ginger root	Zingiberaceae	To treat sore throat, common cold, cough	
Cloves (<i>Solanum aromaticum</i>)	Aromatic flower buds	Myrtaceae	Sore throat, cold, cough, Sinusitis	

Visual inspection determination

Shape, colour, appearance, and taste of lozenges are evaluated visually [5].

Weight of lozenges

The weight of the lozenges, which ranged in weight from 1.5 to 4.5 g, should be used. The weight for the lozenges is between these ranges, and these values apply to all lozenges [3].

Thickness uniformity

We chose the six lozenges that were randomly chosen for each batch in order to assess the thickness uniformity of the lozenges and the vernier capillaries were used to measure the lozenges thickness [3].

Diameter

The medicinal lozenges' diameter, size, and form this relies on the moulds that were chosen. Lozenges can be made in a variety of sizes and shapes, but they are often circular, flat or biconvex, and shaped like ice cubes or rectangles. They have two forms [3].

Dissolving test

The in-vitro dissolving test of the lozenges showed that the highest amount of drug release is of 98.91% in 45 minutes of the FL2 formulation, which was thought to be the best formulation. The manufactured lozenges show that around 50% of the drug is released within 15 minutes so that tested the medicated lozenge in vitro dissolving test [3].

pH

We utilized a pH meter in the lab to measure the pH level of the lozenge. The lozenge's typical pH range is 5 to 7 [2].

RESULTS AND DISCUSSION

Preparation

The above herbs were collected and boiled to obtain an extract and filtered plant extracts. Put 1/2 kg of white sugar in another container and bring to a boil. Mix white sugar and herb filtrate. Then add a spoonful of honey and lemon juice. Stir nicely till preferred consistency is achieved. The semi-solid

mixture was poured into moulds and allowed to cool completely. Lozenges are solid dosage forms of various shapes, usually containing medicinal ingredients and flavourings, intended to slowly dissolve in the mouth to produce a local or systemic effect.

Evaluation test

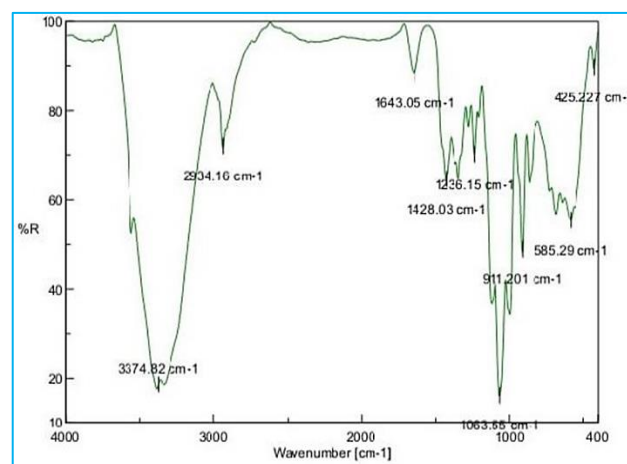
Table 3 Evaluation properties of medicated lozenges

Shape	Rectangular, circular
Size	Medium
Colour	Brown
Odour	Characteristic
Taste	Sweet and spicy

Table 4 Evaluation properties of medicated lozenges

Weight	4.430 g (Varies)
Thickness	3.19 mm
Diameter	3.0 mm
Dissolving	8 minutes
pH	6.78

Instrumentation analyzes for lozenge



Graph 1 FTIR analysis

FTIR analysis [9- 10]

Table 5 FTIR analysis

Peak	Appearance	Functional group	Compound class
3374.82 cm ⁻¹	Strong, Broad	O-H Stretching	Alcohol
2934.16 cm ⁻¹	Medium	C-H Stretching	Alkane
1643.05 cm ⁻¹	Medium	C=C Stretching	Alkene
1428.03 cm ⁻¹	Medium	O-H Bending	Alcohol
1236.15 cm ⁻¹	Strong	C-O Stretching	Alkyl Aryl Ether
1063.55 cm ⁻¹	Medium	C-N Stretching	Amine
585.29 cm ⁻¹	Strong	C-I Stretching	Halo compound

CONCLUSION

The project's ultimate goal is to make natural lozenges without the use of chemicals. These lozenges were used to treat the mouth and throat in preparation for the slow administration of cough medicines or digestive aids. These lozenges are entirely chemical-free and comprised of natural materials. Holy basil, *Solanum trilobatum*, *Glycyrrhiza glabra*, Mexican mint, Ginger, and Clove are the natural constituents that have functional bio-active compounds to treat sore throat. The

formulated lozenges were evaluated for taste, flavour, thickness, weight variation, pH, and characterized by FTIR analysis. The lozenge composition is optimized for taste, aroma and structure-forming ability. This result showed that our medicated lozenge can be used as a delivery method for the treatment of sore throat and associated infections.

Acknowledgement

We gratefully acknowledge the support and TACW DST FIST resources offered by our college administration for this research project.

LITERATURE CITED

- Shojaei HA. 1998. Development of medicated Lozenges. *Jr. Pharm. Science* 1(1): 15-30.
- Pothu R, Yamsani MR. 2014. Lozenges formulation and evaluation: A review. *International Journal of Pharmaceutical Research and Applications* 6(6): 678-684.
- Chanda R, Nallaguntla L. 2020. Formulation of medicated lozenges for sore throat. *Asian Journal of Pharmaceutical and Clinical Research* 13(10): 62-67.
- Kadirvel V, Vasuki MT, Narayana GP, Kulathooran R. 2022. Formulation and evaluation of medicated lozenges using traditional herbs to treat sore throat infection. *Journal of Food Processing and Preservation* 46(10): e16903.
- Binu A, Irene T, Beena P, Abraham E. 2018. Formulation and evaluation of herbal lozenges containing eucalyptus oil and *Coleus aromaticus* oil. *American Journal of PharmTech Research* 8(1): 316-322.
- Dinesh Mohan S, Vanitha K, Rames A, Srikanth G, Akila S. 2010. Review on medicated lozenges. *Int. Jr. Res. Pharm. Biomed. Science* 1(2): 105-108.
- Anshul Kumar, Manish Kumar, Mishra Afeefa A, Chandrashekar KS. 2019. Development and evaluation of polyherbal lozenges for cold and flu. *Indian Journal of Pharmaceutical Education and Research* 53(2s): s159-s163.
- Rehman H, Zahoor A, Shaikh ZA, Naveed S, Khan U. 2017. Polyherbal extract based Linkus lozenges for symptomatic relief, design development and evaluation. *American Journal of Advanced Drug Delivery* 5(1): 11-18.
- Revathi S, Preetha V, Swetha V, Lavanya C. 2022. Comparative study of effect of sugar on yield of different legume plants. *International Journal of Botany Studies* 7(1): 233-235.
- Kalaimathi J, Sridevi B, Ananthi S. 2019. Glycine max seed mediated synthesis and characterization of zinc oxide nanoparticles and its antifungal activity against pathogenic fungal strains. *Indian Journal of Public Health Research and Development* 10: 3628.