

FORMULATION AND EVALUATION OF SEA BUCKTHORN LOZENGES

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ABSTRACT

The present study focuses on the formulation of seabuckthorn-based herbal lozenges using a natural and effective approach. Seabuckthorn extract was prepared by maceration using a suitable solvent, followed by filtration and concentration to obtain a thick extract rich in bioactive constituents. The formulation of lozenges was carried out using jaggery as a base and corn syrup as a binding agent, along with citric acid for flavor enhancement. The molten base was prepared by heating jaggery and corn syrup, into which the seabuckthorn extract was incorporated with continuous stirring to ensure uniform distribution. The mixture was further processed to obtain a semi-solid consistency and poured into moulds, followed by cooling and solidification at room temperature. The prepared lozenges were collected and stored in airtight containers to maintain stability. The formulation demonstrated desirable physical characteristics, uniformity, and ease of preparation. The use of natural ingredients enhances the therapeutic potential and patient acceptability of the formulation. Overall, seabuckthorn lozenges represent a promising herbal dosage form with potential health benefits.

KEYWORDS: Seabuckthorn, Herbal Lozenges, Maceration, Oral Dosage Form, Nutraceutical.

INTRODUCTION

Cough and throat irritation are among the most common health problems affecting individuals across all age groups, often resulting from infections, environmental pollutants, or allergic conditions. Lozenges are widely used as a convenient and effective dosage form for the management of such conditions, as they dissolve slowly in the oral cavity, providing prolonged local action and soothing effects on the throat mucosa.^[1,2]

Medicated lozenges are solid oral dosage forms designed to deliver active ingredients directly to the oral cavity and throat region. They offer several advantages such as ease of administration, improved patient compliance, and avoidance of first-pass metabolism. Additionally, lozenges allow for sustained release of active constituents, enhancing therapeutic efficacy in treating cough, sore throat, and oral infections.^[3,4]

In recent years, there has been increasing interest in herbal and natural formulations due to the limitations associated with synthetic drugs, including side effects, drug resistance, and patient intolerance. Herbal lozenges, formulated using plant-based ingredients, provide a safer and more holistic approach to therapy, combining therapeutic and nutritional benefits.^[5,6]

Sea buckthorn (*Hippophae rhamnoides*) is a medicinal plant widely recognized for its rich phytochemical composition and therapeutic potential. It contains a wide range of bioactive compounds including vitamins (especially vitamin C and E), flavonoids, carotenoids, polyphenols, and essential fatty acids, which contribute to its antioxidant, anti-inflammatory, antimicrobial, and immunomodulatory properties.^[7-9]



The antioxidant activity of sea buckthorn is primarily attributed to its high content of phenolic compounds and vitamins, which help in scavenging free radicals and protecting tissues from oxidative stress. These properties are particularly beneficial in managing inflammatory conditions of the throat and respiratory tract.^[10,11]

Sea buckthorn also exhibits significant antimicrobial activity against various pathogens responsible for respiratory infections. Its bioactive constituents help in inhibiting microbial growth and reducing infection-related inflammation, thereby providing symptomatic relief in cough and sore throat conditions.^[12,13]

In addition to its antimicrobial and antioxidant properties, sea buckthorn possesses mucosal healing and soothing effects, making it an ideal candidate for incorporation into lozenge formulations. The presence of fatty acids and bioactive compounds helps in maintaining mucosal integrity and promoting tissue repair.^[14,15]

The formulation of lozenges involves the use of suitable excipients such as sweetening agents, binders, lubricants, and flavoring agents to enhance palatability, stability, and patient acceptability. Techniques such as heating and congealing or direct compression are commonly employed to prepare lozenges with uniform weight, hardness, and drug content.^[16,17]

Evaluation of lozenge formulations is essential to ensure quality and performance. Parameters such as weight variation, hardness, friability, disintegration time, and drug release are commonly assessed. These evaluations help in optimizing the formulation and ensuring its effectiveness in delivering the active ingredient.^[18,19]

The growing demand for natural, safe, and effective dosage forms has led to increased research in the development of herbal lozenges. Sea buckthorn-based lozenges offer a promising alternative to conventional formulations by combining therapeutic efficacy with nutritional benefits, making them suitable for managing cough and throat-related disorders.^[20-22]

Therefore, the present study focuses on the formulation and evaluation of sea buckthorn lozenges with the aim of developing a stable, effective, and patient-friendly herbal dosage form. The study also emphasizes the potential of sea buckthorn as a valuable natural ingredient in pharmaceutical and nutraceutical applications.^[23-25]

METHODOLOGY

S. No.	Ingredient	Quantity (g)	Role / Use
1	Sea buckthorn dry extract	0.20 gm	Active ingredient (Vit C, Omega-7, antioxidants)
2	Jaggery	2.00 gm	Natural sweetening agent & base
3	Corn syrup	0.60 gm	Binder & texture improver
4	Citric acid	0.07 gm	Flavour enhancer & preservative
5	Peppermint essence	Q.S	Flavouring & cooling agent

Microscopy of Seabuckthorn Powder

Seabuckthorn powder was subjected to microscopic evaluation to study its characteristic features. A small quantity of the powder was placed on a clean glass slide, followed by the addition of a drop of glycerin as a mounting medium. A cover slip was carefully placed over the sample to avoid the formation of air bubbles. The prepared slide was then observed under a microscope at magnifications of 10X and 40X. During observation, characteristic structural features such as fibers, cells, and other diagnostic elements were identified and analyzed. Representative images of the observed structures were captured for documentation and further evaluation.

The extraction and formulation of seabuckthorn-based preparation were carried out using a systematic procedure.

Initially, seabuckthorn powder (50 g) was subjected to maceration by mixing it with a suitable solvent, such as water or ethanol, and kept for 24–48 hours with intermittent shaking to ensure efficient extraction of phytoconstituents. The mixture was then filtered using Whatman filter paper, and the filtrate was collected. In the case of ethanolic extraction, the solvent was evaporated using a hot plate until a thick, concentrated extract was obtained.

Subsequently, the required quantities of ingredients, namely seabuckthorn extract (4 g), jaggery (40 g), corn syrup (12 g), and citric acid (1.40 g), were accurately weighed. For the preparation of the base, jaggery was taken in a clean beaker and gently heated until completely melted. Corn syrup was then added to the molten jaggery and mixed thoroughly to obtain a smooth and homogeneous base. The active ingredient, seabuckthorn extract, was gradually incorporated into the molten base with continuous stirring to ensure uniform distribution. Thereafter, citric acid was added as an excipient to enhance the flavor, and the mixture was stirred continuously. Finally, the formulation was subjected to further heating until a semi-solid, thick consistency was achieved, while taking care to avoid overheating, thereby ensuring the stability and quality of the final product.



Mixing of Sea Buck thorn

The prepared semi-solid mass was then poured into suitable moulds to obtain the desired shape of lozenges and allowed to cool and solidify at room temperature. After complete solidification, the formed lozenges were carefully removed from the moulds to prevent breakage or deformation. Finally, the prepared lozenges were stored in airtight containers and kept in a cool and dry place to maintain their stability, prevent moisture absorption, and ensure prolonged shelf life.



RESULT

1. Microscopy result

Numerous circular and oval structures, likely represent oil globules or cell inclusions, which are common in Sea Buckthorn due to its rich lipid content. The background appears to show irregular, thin-walled cells, typical of plant tissue, indicating the presence of parenchyma. Some elongated, thread-like elements may be visible, suggesting fibers, which contribute to the structural framework of the plant material. Fine granules scattered throughout may indicate cellular debris, starch grains, or phytoconstituents. Yellowish brown coloration is characteristic of Sea Buckthorn and may be due to carotenoids and other bioactive compounds. These microscopic features confirm the plant origin and authenticity of Sea Buckthorn powder. The presence of oil globules, fibers, and parenchymatous cells supports its known composition rich in lipids, antioxidants, and phytoconstituents.

2. Evaluation of Lozenges

- i. **Hardness:** The hardness of the lozenges was determined using a Pfizer hardness tester. Few lozenges was placed between the plungers of the apparatus and pressure was applied manually until the lozenge fractured. The force required to break the lozenge was recorded in kg/cm². The hardness of the prepared lozenges was found to be in the range of 10-12 kg/cm², indicating
- ii. **Dissolution Time:** The Dissolution time was determined by placing lozenges in a beaker containing simulated saliva fluid at 37°C and noting the time required for complete dissolution. The dissolution time was found to be 8 minutes.
- iii. **Appearance:** The prepared lozenges were visually inspected for color, shape, and surface characteristics. Lozenges were smooth, glossy, and uniformly shaped with dark brown to black color.
- iv. **Taste:** Lozenges was having slightly bitter taste, which was masked by sweetening agents.
- v. **pH:** The pH of the lozenges was determined by dissolving one lozenge in a suitable quantity of distilled water and measuring the pH using a calibrated digital pH meter. The pH of the solution was found to be in the range of 5.5–6.5, indicating suitability for oral cavity without causing irritation.

CONCLUSION

The present study successfully demonstrated the extraction of seabuckthorn and its incorporation into lozenge formulation using a simple and effective method. The maceration technique yielded a concentrated extract rich in phytoconstituents, which was uniformly incorporated into a jaggery-based matrix. The prepared lozenges exhibited desirable characteristics such as proper shape, uniformity, and acceptable consistency after moulding and cooling. The use of natural ingredients like jaggery and seabuckthorn enhances the therapeutic as well as nutritional value of the formulation. Proper storage in airtight containers ensured stability by preventing moisture absorption. Overall, the developed seabuckthorn lozenges can be considered a promising natural formulation with potential health benefits and good patient acceptability.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this research work.

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