INFORMATICS JOURNALS
RESEARCH ARTICLE
©2023 The Academy of Environmental Biology, India
Journal of Ecophysiology and Occupational Health, Vol 26(3), DOI: 10.18311/jeoh/2026/48756, 399-406, September 2026
ISSN (Online) : 0972-4397
ISSN (Online) : 0974-0805

Formulation, Optimization and Evaluation of Herbal Lozenges Containing *Helianthus tuberosus* for the Obesity Management in Sedentary Occupational Adults

Agilandeswari Devarajan, Ashly Merin George*, V. Vijayanandhan,Mamta, Prity Sarkar, Mohammed Noman Ansari, Nisa Kumari Gupta and G. M. Madhan

Department of Pharmaceutics, MVM College of Pharmacy, Bangalore - 560064, Karnataka, India; ashlymerin@gmail.com

Abstract

Herbal lozenges were developed using a simple melting and moulding technique and evaluated to manage irregular eating habits, reduce appetite and decrease body fat for Occupational obesity control. The formulation contained *Helianthus tuberosus*, *Zingiber officinale*, *Elettaria cardamomum*, *Stevia rebaudiana* and isomalt as a base. The lozenges showed physicochemical properties with a pH of 6.56–6.78, moisture content of 0.55% and hardness comparable to marketed products. Optimized formulations show glassy, brownish, bean-shaped and characteristic herbal odour. Friability was very low at 0.05%, indicating strong mechanical strength, while weight variation stayed within –2.87% to 2.29%, ensuring uniformity. The average disintegration time was 13–15 minutes, supporting proper dissolution. Among all formulations, F6 has shown more potential as a viable herbal alternative to marketed lozenges. Stability studies confirmed that the lozenges maintained their physical and chemical properties under controlled storage conditions. Overall, the herbal lozenges were stable, effective, patient-friendly especially in sedentary occupational adults and with further clinical trials recommended to confirm safety and efficacy which can be used for long-term use.

Major Findings: Herbal lozenges containing *Helianthus tuberosus* (optimized batch F6) were successfully formulated with acceptable physicochemical properties (pH 6.56–6.78, moisture content 0.55%, friability 0.05%, weight variation ≤2.29%), despite the raw powder itself showing poor flow characteristics (angle of repose 52.2°, Carr's index 30.64%). F6 exhibited hardness (14 kg/cm²) and disintegration time (13-15 min) comparable to marketed Vicks lozenges, confirming adequate mechanical strength for buccal administration. Stability studies over 90 days showed no microbial growth or significant changes in appearance, pH or hardness, supporting F6 as a stable, patient-compliant herbal candidate for occupational obesity management.

Keywords: Formulation, Herbal Lozenges, Occupational Obesity Control, Physicochemical Evaluation, Stability Studies

Article Received on: 01.06.2026 Revised on: 01.09.2026 Accepted on: 07.09.2026

1. Introduction

Occupational obesity represents a global pandemic with intense health complications. Ayurvedic principles address this condition by restoring equilibrium in dhatus and doshas[1]. As a primary contributor to metabolic syndrome, occupational obesity aggravates into numerous lifestyle-associated disorders[2]. Obesity defined by a Body Mass Index (BMI) of 30 kg/m² or above, obesity affects more than 250 million people globally and is closely linked to serious health conditions — including type 2 diabetes, hypertension and dyslipidaemia — driven primarily by adipose tissue dysfunction and chronic inflammation. Brain imaging studies (fMRI) in obese individuals uncover

*Author for correspondence

amplified responses to food sights/smells, stronger eating drives and poorer impulse control, stemming from shifts in brain anatomy and neural connections[3]. These findings highlight the CNS's crucial role in appetite regulation, food intake and energy homeostasis, informing novel therapeutic strategies beyond bariatric interventions[4]. Psychologically, body discomfort correlates with occupational obesity, associating with disordered eating, diminished self-esteem and depression; thus the interplay between body image and weight status warrants further investigation[5].

Occupational obesity constitutes a complex, multifactorial chronic disease. Since 1980, the global prevalence of overweight and sedentary obesity has doubled, now encompassing nearly one-third of the world's population across all ages, sexes, geographies, ethnicities and socioeconomic strata—though rates are higher among older adults and women[6]. This multisystem disorder shortens life expectancy by elevating risks for type 2 diabetes, hypertension, non-alcoholic fatty liver disease, cardiovascular conditions including myocardial infarction, heart failure, atrial fibrillation and stroke, obstructive sleep apnoea, osteoarthritis, mental disorders and select cancers[7].

Lozenges are solid oral dosage forms used for dissolution in the oral cavity or pharynx, typically comprising medicaments in a sweetened, flavoured base. They alleviate local irritation or infection and facilitate systemic absorption via buccal mucosa or swallowing. Medicinal plants and their phytochemicals, including essential oils, have demonstrated anti-obesity efficacy in traditional therapies such as aromatherapy and their practical applications[8].

Helianthus tuberosus L., rich in inulin which is a low-calorie prebiotic fibre which can modulate occupational obesity. It acts by metabolic regulation, appetite suppression, delayed fat absorption, reduced triglycerides, glycaemia and lowered cholesterol[9]. Formulating herbal lozenges which is an innovative, patient-compliant delivery system, integrating herbal benefits with modern pharmaceutics. This approach offers a modality for occupational obesity management, advancing nutraceutical and pharmaceutical innovations against a global health challenge.

2. Materials and Methods

Collection of Materials- *Zingiber officinale* was cleaned and sun dried. The plant material was powdered using simple mixer blender available in lab and stored in airtight containers away from light. For quality assessment of formulation, different instruments are used available in central instrumentation room of institute. Silicone moulds were used for preparation of lozenges.

2.1 Preformulation Studies

2.1.1 Organoleptic Evaluation

All the ingredients from sources available were taken and have been assessed through organoleptic properties of each ingredient.

2.1.2 pH of Helianthus Tuberosus Powder

A solution of 1g herbal powder dissolved in 50ml of distilled water was prepared and the pH of solution was measured by using pH meter[10].

2.1.3 Loss on Drying

Loss on Drying (LOD) is used to quantify the amount of moisture present in each sample. Add 1gm of *Helianthus tuberosus* powder to an alumina ceramic crucible, then heated it in a drying oven at 80°C for 4 hours and the subsequent mass loss representing the weight of the evaporated substances which is then calculated as a percentage of the original sample mass[11].

$$\text{LOD (\%)} = [(\text{Initial weight} - \text{Final weight}) / \text{Initial weight}] \times 100$$

2.1.4 Solubility

Drug solubility plays a critical role in determining the bioavailability, release rate, and therapeutic efficacy of pharmaceutical products. In this study, the solubility of *Helianthus tuberosus* powder was evaluated across a range of solvents, including distilled water, cold water, hot water, ethanol and acetone.

2.1.5 Bulk Density

The bulk density of drug was determined by introducing 1g of *Helianthus tuberosus* powder into a 10ml graduated cylinder and noted the volume.

2.1.6 Tapped Density

Tapped density was determined using the three-tap method. Briefly, 1 g of *Helianthus tuberosus* powder was carefully introduced into a 10 ml graduated cylinder. The cylinder was

then dropped onto a hard wooden surface from a height of 1 inch, repeated 50 times at intervals of 2 seconds[12, 13].

2.1.7 Angle of Repose

The funnel was clamped with its tip positioned 2 cm above a sheet of graph paper placed on a flat horizontal surface. *Helianthus tuberosus* powder was then carefully poured through the funnel until the apex of the resulting cone reached the tip of the funnel. The mean diameter of the base of the resulting powder cone was subsequently measured, and the angle of repose was calculated from the area of the base circle The static angle of repose was measured using a dry funnel[14].

2.2 Formulation of Herbal Lozenges

The drug and other ingredients were procured from the local market respectively to prepare herbal lozenges, which include *Helianthus tuberosus* powder, isomalt as sugar base, ginger, cardamom as preservative and flavoring agents and stevia for sweetness. All the ingredients were made into fine powder using mortar and pestle and sieved through mesh number 100. For the preparation of the herbal lozenges all the ingredients were weighed as per required quantity. Heating mantle was switched on and maintained temperature of 50°C. Weighed amount of isomalt was taken in China dish and was placed in preheated heating mantle until melted completely. Once the isomalt was melted, stevia powder was added to obtain a sticky sugar base. Later drug powder *(Helianthus tuberosus* powder) was added to sugar base with continuous stirring using a glass rod. Once the drug gets mixed well into isomalt, ginger powder and cardamom were added. Mix the content until no lumps are present and ensure all ingredients are incorporated well and transferred into a pre-cleaned lozenges mould. The mixture was tapped uniformly to get lozenges in desired shape. Prepared lozenges were kept aside protecting from heat and light in aseptic environment for 2-4 hours. Once dried, remove lozenges from mould. Each lozenge was weighed individually and stored them in airtight container[15]. Formula of herbal lozenges is included in Table 1. The prepared lozenges (Figure 1) were evaluated for different pharmacopoeial parameters and packed in airtight medicated container and labelled.



Figure 1. An image of herbal lozenges

2.3 Optimization of Herbal Lozenges

Based on preliminary screening, eight formulation batches were developed using Full Factorial design. Three independent variables were studied- amount of isomalt (X1), *Helianthus tuberosus* (X2) and stevia (X3), each evaluated at two levels (-1 and +1 representing low and high concentrations). The prepared herbal lozenge batches were evaluated for hardness and disintegration time. The design layout and formulation composition are presented in table 2 and table 3 respectively.

Table 1. Formula for Herbal Lozenge

Ingredients	Qty.
Helianthus tuberosus powder	0.5g
Stevia rebaudiana	0.125g
Zingiber officinale powder	0.1g
Isomalt	1.125g
Elettaria cardamomum extract	q. s

Table 2. Independent variable factors with different levels

Variables	Low (-1)	High (-1)
X1	0.75	1.125
X2	0.3	0.5
X3	0.03	0.125

Table 3. Formulation parameters for optimization of herbal lozenges

Formulation code	X1(gm)	X2(gm)	X3(gm)
F1	0.75	0.5	0.03
F2	1.125	0.3	0.03
F3	0.75	0.5	0.125
F4	0.75	0.3	0.03
F5	1.125	0.5	0.03
F6	1.125	0.5	0.125
F7	0.75	0.3	0.125
F8	1.125	0.3	0.125

2.4 Evaluation of Formulation

Formulation developed was evaluated for different parameters such as physical evaluation, pH of herbal lozenges, moisture content, hardness, friability, weight variation, disintegration test, stability test and comparison study with Vicks lozenges.

2.4.1 Physical Evaluation

Herbal lozenges were evaluated based on their physical appearance which includes diameter, thickness shape, size, color, odor and texture.

2.4.2 pH of Herbal Lozenges

A solution of 1 lozenge dissolved in 50ml of distilled water was prepared and the pH of solution was measured by using pH meter.

2.4.3 Moisture Content

Moisture content was determined to check the moisture present in sample by keeping 1 herbal lozenge prepared in a petri plate. Then heat it in a drying oven at 40°C for 30-45 minutes and the subsequent mass loss represents the weight of the evaporated substances which is then calculated as a percentage of the original sample mass[16].

Moisture content (%) = (weight of water / weight of dry material) × 100

2.4.4 Hardness Test

Using Monsanto hardness test apparatus, comparative study was done for marketed lozenges (Vicks) and herbal prepared lozenges.

2.4.5 Friability Test

Friability is used to measure mechanical strength of the lozenges. Ten pre-weighed lozenges were placed in the friabilator, which was rotated at 25 rpm for at least 4 minutes. At the end of the test, the lozenges were dusted and reweighed, and the friability was calculated as a percentage using a Roche friabilator[17].

% Friability = (Loss in weight / Initial weight) X 100

2.4.6 Weight Variation Test

10 prepared lozenges were weighed individually. The average weight and individual weight and measured.

% deviation = [n / average weight] x 100

Where n = difference between average weight and actual weight.

2.4.7 Disintegration Test

Two lozenges were placed individually into each tube of the cylindrical disintegration test apparatus, maintained at a temperature of 37 ± 2°C with water as the immersion fluid. The time required for the lozenges to completely disintegrate and pass through the mesh was recorded[18].

2.4.8 Stability Studies

The formulated herbal lozenges were chosen for real-time evaluation where it was stored and kept in a cool and dry place undisturbed for 6 months from the date of preparation. After that, an assessment was carried out to determine any unfavorable changes in physical appearance, pH. The stability studies were performed by placing formulated herbal lozenges in an airtight container and checked for the presence of bacterial or fungal growth from the day of preparation and the results were recorded[19].

2.4.9 Comparative Study

The comparative study was performed by measuring the hardness and disintegration time for the optimized formulation of *Helianthus tuberosus* herbal lozenges with a marketed product with similar weight. The data obtained was noted[20].

3. Results and Discussion

3.1 Preformulation Studies

Authentication of herbal materials, physiochemical properties like pH, Loss on Drying (LOD), solubility and flow property of *Helianthus tuberosus powder* was studied to observe the drug performance and development of efficacious dosage form, which is palatable, compatible and suitable for human usage.

3.1.1 Organoleptic Property

All the ingredients were evaluated for their basic organoleptic characteristics and shown satisfactory results.

3.1.2 *pH determination of Helianthus tuberosus powder*

The pH of the herbal powder (*Helianthus tuberosus* powder) was found to be 6.8 indicates a mildly acidic to neutral formulation, which is within the generally acceptable range (5.5–7.5) for oral dosage forms.

3.1.3 *Loss on Drying*

The Loss on Drying (LOD) of powder was found to be 1.9% which is accordance with the reference value <2% making it potential to use. LOD values below 10% are generally desirable for most plant-based powders, as lower moisture inhibits microbial growth and prevents undesirable caking or agglomeration during storage.

3.1.4 *Solubility of Herbal Powder*

The solvents used in this study included cold water, hot water, ethanol, and acetone. The results revealed that the herbal powder was partially soluble in hot water, ethanol, and acetone, all of which are polar solvents, suggesting a degree of polarity compatibility between these solvents and the powder. However, insolubility was observed in cold water. This suggests that the substance is moderately polar in nature indicating powder having some non-polar characteristics and larger molecular size particles.

3.1.6 *Bulk and Tapped Density*

The bulk and tapped density of the *Helianthus tuberosus* powder was calculated and was found to be 0.43 and 0.62 respectively.

The Carr's compressibility index was calculated to be 30.64% and the Hausner ratio was found to be 1.44. According to standard flow classification, a compressibility index between 26–31% and a Hausner ratio between 1.35–1.45 both correspond to 'poor' flow properties. This indicates that the *Helianthus tuberosus* powder possesses considerable cohesiveness and interparticulate friction, which may be attributed to its fine particle size, fibrous inulin content and moisture-retaining nature. These findings are consistent with the high angle of repose (52.2°) reported in Section 3.1.7, further confirming poor flowability of the powder. This poor flow behaviour justified the choice of a melting and moulding technique for lozenge preparation over a direct compression method, which would otherwise require flow-corrective measures such as glidants or granulation.

3.1.7 *Angle of Repose*

The angle of repose was found to be 52.2 degree which indicated very poor flow property of the *Helianthus tuberosus* powder.

3.2 Optimization of Herbal Lozenges

Formulation code of all eight batches along with hardness and disintegration time and results is shown in Table 4. From the data, it is evident that formulations F6 shown, hardness and disintegration time as per values in monograph.

3.3 Evaluation of Herbal Lozenges

The evaluation of formulated herbal lozenges using formulation code F6 was done which involved parameters

Table 4. Optimization by factorial design

Formulation code	Independent variables			Response variable	
	X1 Isomalt (gm)	X2 *Helianthus tuberosus* (gm)	X3 Stevia (gm)	Y1 Hardness (kg/cm^2)	Y2 Disintegration time (minutes)
F1	0.75	0.5	0.03	8.5	10:45
F2	1.125	0.3	0.03	12.1	11:12
F3	0.75	0.5	0.125	7.2	09:45
F4	0.75	0.3	0.03	6.5	09:55
F5	1.125	0.5	0.03	12.5	13:15
F6	**1.125**	**0.5**	**0.125**	**14.1**	**15:30**
F7	0.75	0.3	0.125	9.8	13:05
F8	1.125	0.3	0.125	13.4	13:30

X1= Isomalt (gm), **X2**= *Helianthus tuberosus* (gm), **X3**= Stevia (gm)
Y1= Hardness (kg/cm^2), **Y2**= Disintegration time (mins)

like physical appearance, pH, moisture content, hardness, friability, weight variation, disintegration, antimicrobial studies and stability studies.

3.3.1 Physical Evaluation

The physical evaluation of herbal lozenges was found to have smooth texture, bean shaped, dark brownish color and characteristic odour. The diameter and thickness were found to be 16mm and 8mm respectively shown in Table 5. These dimensions are typical herbal lozenges sizes ensuring appropriate drug loading and patient acceptability.

3.3.2 pH of Herbal Lozenges

The pH of herbal lozenges was measured using a pH meter which was found to be 6.55 to 6.78 indicates mild acidic to neutral which is safe for oral consumption.

3.3.3 Moisture Content

The moisture content was determined by keeping a prepared lozenges in hot air oven for 45 minutes and was found to be 0.55% which comes under the preferable value of moisture content >1%.

3.3.4 Hardness Test

The hardness of formulated lozenges was determined by comparison with marketed lozenges (Vicks) using Monsanto tester. The hardness of both marketed and formulated lozenges was found similar at 14kg/cm^2. Both the lozenges have almost same hardness that shows that formulated lozenges are as strong as marketed lozenges.

Table 5. Physical Characteristics of Herbal lozenges

SL. NO.	Description	Characteristics
1	Shape	Bean shaped
2	Texture	Glassy smooth
3	Color	Brownish shade
4	Odour	Characteristic odour
5	Diameter	16mm
6	Thickness	8mm

Table 6. Stability study data of optimized herbal lozenges

Parameters	1 Day ±SD	90 days ±SD
Physical appearance	Dark brownish color	Dark brownish color
Ph	6.56 ±0.02	6.78 ±0.14
Hardness	13.9 kg/cm^2	13.5 kg/cm^2
Disintegration	15:51 mins	13:08 mins
Microbial growth	--	--

3.3.5 Friability Test

The friability test was performed on 10 formulated herbal lozenges and was found to be 0.05% which is as per the value given in reference. It indicates less loss of ingredients and breakage of lozenges during packaging and transport.

3.3.6 Weight Variation Test

The weight variation of 10 formulated herbal lozenges was determined. Percentage deviation in weight variation was found to be less than 2.29%, which is ideal.

3.3.7 Disintegration Test

The disintegration rate of the formulated herbal lozenges was determined on day one and on 30th day from preparation. The disintegration rate of the formulated herbal lozenges was found to be 13 minutes to 15 minutes and ideal time required for dissolving lozenges for drug release.

3.3.8 Stability Studies

The stability study for the formulated lozenges was performed and no microbial growth was found after 90 days. The results (given in Table 6) confirm there is no larger change at the end of three months, which is a valuable information regarding the lozenges stability and its suitability for long-term use.

3.3.9 Comparative Study

The optimized herbal lozenges are typically developed to have comparable pH (6.56-6.78), moisture content (0.55%), hardness (13.5kg/cm^2), friability (0.05%), disintegration time (13-15 minutes) and weight uniformity (±2.29%) as reported for Vicks lozenges, ensuring satisfactory mechanical strength and patient acceptability. All the results show that prepared anti-obesity herbal lozenges comply with the pharmacopoeial standards. Thus, the developed lozenges meet the desired quality. The herbal anti-obesity lozenges containing potent drugs of natural origin were successfully prepared and evaluated. These herbal anti-obesity lozenges are helpful for occupational obesity modulation.

4. Conclusion

Herbal lozenges were prepared using a conventional melt-and-mould technique, incorporating herbal powders with isomalt as the base. The authenticity and quality of raw herbal materials were evaluated and organoleptic evaluation were performed to ensure patient acceptability. Herbal lozenges represent a safe, non-invasive delivery system for obesity management, offering a herbal oral dosage form that enhances patient compliance. Key ingredients included *Helianthus tuberosus* (Jerusalem artichoke), *Zingiber officinale* (ginger), *Elettaria cardamomum* (cardamom), *Stevia rebaudiana* Bertoni and isomalt as the base. The blended herbal powder exhibited a mildly acidic to near-neutral pH of 6.8, compatible with the oral cavity. Loss on drying was low (1.9%), signifying minimal moisture and favourable storage stability. Flow properties were poor, reflected by a high compressibility index (30.64%) and angle of repose (52.2°), which is suitable for herbal powders.

Formulated lozenges displayed a brownish, bean-shaped morphology with a glassy texture and characteristic odour. Their pH ranged from 6.56–6.78, indicating mild acidity suitable for salivary compatibility. Moisture content was 0.55%, friability 0.05% denoting minimal ingredient loss and robustness which confirming uniformity of formulation. Disintegration time ranged from 13–15 min, appropriate for buccal administration. Stability studies revealed no substantial alterations in physicochemical properties and accelerated stability testing over three months showed no significant changes in appearance, pH, hardness or microbial load. Comparative analysis with commercial lozenges assured that F6 formulation as a promising candidate for occupational obesity modulation.

5. Acknowledgements

The authors thank the Management, MVM Group of Institutions and Principal, MVM College of Pharmacy for supporting for the successful completion of the project.

6. References

1. Panwar S, Joshi R, Prakash P. Sthaulya w.s.r. to obesity: a review. Int Res J Ayurveda Yoga. 2023; 6(6):197-202. https://doi.org/10.47223/IRJAY.2023.6633
2. Suprayogi D, Sari AN, Arief R. Rural-urban differences in overweight and obesity of adolescents: a review article. Proc Int Conf. 2023 Jan 30; 1(1):124-56. https://doi.org/10.29080/ichafohn.v1i1.1126
3. Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis. Am J Manag Care. 2016; 22(9 Suppl):S176-S185. https://doi.org/10.1186/1471-2458-9-88 PMid:19320986 PMCid:PMC2667420.
4. Makaronidis JM, Batterham RL. Obesity, body weight regulation and the brain: insights from fMRI. Br J Radiol. 2018; 91(1089):20170910. https://doi.org/10.1259/bjr.20170910 PMid:29365284 PMCid:PMC6223152.
5. Weinberger NA, Kersting A, Riedel-Heller SG, Luck-Sikorski C. Body dissatisfaction in individuals with obesity compared to normal-weight individuals: a systematic review and meta-analysis. Obes Facts. 2016; 9(6):424-41. https://doi.org/10.1159/000454915 PMid:28118635.
6. Gallagher D, Dey DK, Viswanathan M, Shen W. Healthy percentage body fat ranges: an approach for developing guidelines based on body mass index. Am J Clin Nutr. 2000; 72(3):694-701. https://doi.org/10.1093/ajcn/72.3.694 PMid:10966886 PMCid:PMC7817282.
7. Varra FN, Varra VK, Nobelos PT. Molecular and pathophysiological relationship between obesity and chronic inflammation in the manifestation of metabolic dysfunctions and their inflammation-mediating treatment options: a review. Int J Mol Med. 2024; 29(6):95. https://doi.org/10.3892/mmr.2024.13219 PMid:38606791 PMCid:PMC11025031.
8. Keith SW, Redden DT, Katzmarzyk PT, Boggiano MM, Han H, Chou MD, et al. Putative contributors to the secular increase in obesity: exploring the roads less traveled. Int J Obes (Lond). 2006; 30(7):1065-94. https://doi.org/10.1038/sj.ijo.0803327 PMid:16801945.
9. Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999-2000. JAMA. 2002; 288(14):1723-7. https://doi.org/10.1001/jama.288.14.1723 PMid:12365955.
10. Birari RB, Bhutani KK. Natural products in anti-obesity therapy. Drug Discov Today. 2010; 15(15-16):668-75.
11. Kazemipour N, *et al.* Herbal medicine for the treatment of obesity: a review. J Med Plants Res. 2017; 11(32):512-23.
12. Sai Datri, Lakshmana Rao, Mahesh Chandra Narayana, Durga Bhavani, Bhargavi, Yamini Padma Bhavani, *et al.* Formulation and evaluation of herbal lozenges using Embelia ribes. Res J Drug Alcohol Res. 2023; 12(2).
13. Mishra KK, Tasneem K, Jain V, Mahajan SC. Formulation and evaluation of herbal lozenges. J Drug Deliv Ther. 2017; 7(7).
14. Ambore S, Kshirsagar A, Bhosle P. Preformulation studies and development of a herbal tooth powder using coconut

shell as a natural abrasive. Int J Sci R Tech. 2026; 3(1):357-63.
15. Vishvnath G, U.K. J. Development of quality control parameters for herbal formulation, Pippali churna. Asian J Res Chem. 2010; 3(4):932-4.
16. Development and evaluation of polyherbal lozenges for cold and flu. Indian J Pharm Educ Res. 2019; 53. https://doi.org/10.5530/ijper.53.2s.61
17. Oberai S, Chauhan R, Mishra R, Gaur PK, Singh R. Formulation and evaluation of herbal lozenges. Res J Pharm Technol. 2025; 18(9):4415-9. https://doi.org/10.52711/0974-360X.2025.00633
18. Formulation development and evaluation of herbal lozenges for the management of recurrent aphthous stomatitis. Int J Res Pharm Pharm Sci. 2021; 5(4):318-25.
19. Maharjan S, Tiwari R, Regmi K, Neupane S. Formulation and evaluation of domperidone lozenges. Asian J Pharm Technol. 2024; 1-4. https://doi.org/10.52711/2231-5713.2024.00001
20. International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use. ICH Harmonised Tripartite Guideline: stability testing of new drug substances and products Q1A(R2); 2003 [cited 2025 Sep 28].

Author Contribution

Conceptualization: Dr. Agilandeswari Devarajan, Ashly Merin George; Methodology: Ashly Merin George, V. Vijayanandhan, Mamta, Prity Sarkar, Mohammed Noman Ansari, Nisa Kumari Gupta and Madhan G.M; Formal analysis: Ashly Merin George, Mamta and Prity Sarkar; Investigation: Ashly Merin George; Data curation: Ashly Merin George, Nisa Kumari Gupta, Madhan G.M; Writing – original draft preparation: Ashly Merin George; Writing, review and editing: Dr. Agilandeswari Devarajan, V. Vijayanandhan, Prity Sarkar and Mohammed Noman Ansari; Supervision: Dr. Agilandeswari Devarajan. All authors have read and agreed to the published version of the manuscript.

Access this journal online	
Website: www.informaticsjournals.co.in/index.php/JEOH/index	Quick Response Code