ORIGINAL ARTICLE

FUTURE JOURNAL OF PHARMACEUTICALS AND HEALTH SCIENCES

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Synthesis and Assessment of Herbal Lozenges Manufactured from *Piper Longum* and Eucalyptus Leaves that Contain Volatile Oil

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Article History:

Received on: 05 Apr 2023
Revised on: 20 Apr 2023
Accepted on: 21 Apr 2023

Keywords:

Piper longum, Eucalyptus. Lozenge, oropharyngeal inflammation, roller compression

ABSTRACT

This study aimed to formulate the lozenge pills, extract the leaves of Piper longum oil and Eucalyptus, and research a viable dosage form. Using the Roller compression process, lozenge tablets were created. The tablets' physicochemical characteristics, such as Hardness, friability, weight uniformity, thickness, and disintegration speed, were also assessed. The product's inhibitory effectiveness against non-resistant C.albicans infections made it a perfect release matrix for piper longum and eucalyptus leaf combination extract. The outcomes show that prepared lozenge pills can substitute for conventional forms.

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eISSN: 2583-116X pISSN:

DOI: https://doi.org/10.26452/fjphs.v3i2.460

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INTRODUCTION

One of the most frequent complaints treated by emergency physicians is pharyngitis, also known as a painful throat. This condition is an inflammation of the oropharynx. Viruses, Streptococcus, mononucleosis, Mycoplasma, gonorrhea, and diphtheria are among the causes of sore throat. A sizable portion of patients has no known reason. Lozenges are flavored, medicinal dose forms that are held in the mouth or pharynx while sucked. Moreover, they are solid preparations intended to dissolve, dissolve [1, 2], or disintegrate gradually in the mouth [3, 4]. They often have one or more medications in a flavored, sweet foundation.

Most of the time, tablets are utilized for localized effects in the mouth. Vitamins, antibiotics, anesthetics, antihistamines, decongestants, corticosteroids, astringents, analgesics, and other substances may be present [5–7].

The oropharyngeal symptoms that tablets are meant to relieve are typically brought on by local infections. However, they can also be brought on by allergies or mouth-breathing-related drying of the mucosa.

MATERIALS AND METHODS

Plant Material Collection and Authentication

Piper longum and Eucalyptus leaves were collected from nearby Tirupati, India's Andhra Pradesh. Dr. K. Madhava Chetty identified and verified plant materials, Assistant Professor, Dept. of Botany, Sri Venkateswara University, Tirupati.

Table 1: Formulations containing Eucalyptus Volatile oil alone

Ingredients	E1	E2	E3	E4
Extracts of Eucalyptus Volatile oil	1%	2%	3%	4%
Lactose	30 mg	30 mg	30 mg	30 mg
Gelatin	100 mg	75 mg	50 mg	60 mg
Mannitol	200 mg	200 mg	200 mg	200 mg
Sucrose	663 mg	688 mg	713 mg	703 mg
Magnesium stearate	7 mg	7 mg	7 mg	7 mg
Purified water	q.s	q.s	q.s	q.s

Table 2: Formulations containing Piper longum Volatile oil alone

Ingredients	P1	P2	P3	P4
Extracts of Piper longum Volatile oil	1%	2%	3%	4%
Lactose	30 mg	30 mg	30 mg	30 mg
Gelatin	100 mg	75 mg	50 mg	60 mg
Mannitol	200 mg	200 mg	200 mg	200 mg
Sucrose	663 mg	688 mg	713 mg	703 mg
Magnesium stearate	7 mg	7 mg	7 mg	7 mg
Purified water	q.s	q.s	q.s	q.s

Table 3: Formulations containing both Eucalyptus and Piper longum Volatile oils

Ingredients	G1	G2	G3	G4
Extracts of Eucalyptus Volatile oil	1%	2%	3%	4%
Extracts of Piper longum Volatile oil	1%	2%	3%	4%
Lactose	30 mg	30 mg	30 mg	30 mg
Gelatin	100 mg	75 mg	50 mg	60 mg
Mannitol	200 mg	200 mg	200 mg	200 mg
Sucrose	663 mg	688 mg	713 mg	703 mg
Magnesium stearate	7 mg	7 mg	7 mg	7 mg
Purified water	q.s	q.s	q.s	q.s

Table 4: Physical Stability Evaluation Test of Formulations containing Eucalyptus Volatile oil alone

Physical Stability Evaluation Test	E1	E2	E3	E4
Color	NCC	NCC	NCC	NCC
Odour	NCC	NCC	NCC	NCC
Taste	NCC	NCC	NCC	NCC
Hardness	NCC	NCC	NCC	NCC

NCC – No Characteristic Change

Table 5: Physical Stability Evaluation Test of Formulations containing Piper longum Volatile oil alone

Physical Stability Evaluation Test	P1	P2	P3	P4
Color	NCC	NCC	NCC	NCC
Odour	NCC	NCC	NCC	NCC
Taste	NCC	NCC	NCC	NCC
Hardness	NCC	NCC	NCC	NCC

Table 6: Physical Stability Formulation evaluation tests that include both Eucalyptus and Piper longum Volatile oils

Physical Stability Evaluation Test	G1	G2	G3	G4
Color	NCC	NCC	NCC	NCC
Odour	NCC	NCC	NCC	NCC
Taste	NCC	NCC	NCC	NCC
Hardness	NCC	NCC	NCC	NCC

NCC – No Characteristic Change

Table 7: Assessment of Eucalyptus-containing Formulations Volatile oil alone

Evaluation Test	E1	E2	E3	E4
Hardness	5	6	4	5
Weight variation	Fail	Pass	Pass	Pass
Friability	1.3	1.2	0.4974	0.6478
Dissolution time	11 min	12 min	11 min	14 min
Antimicrobial evaluation	-	12 mm	16 mm	21mm

Table 8: Evaluation Test of Formulations containing Piper longum Volatile oil alone

Evaluation Test	P1	P2	P3	P4
Hardness	4	6	4	5
Weight variation	Fail	Fail	Pass	Pass
Friability	1.5	1.3	0.5964	0.5247
Dissolution time	12 min	13 min	13 min	15 min
Antimicrobial evaluation	-	11 mm	14 mm	16 mm

Table 9: Analytical test of formulations with Eucalyptus as well as Piper longum Volatile oils

Evaluation Test	G1	G2	G3	G4
Hardness	5	5	5	5
Weight variation	Fail	Pass	Pass	Pass
Friability	1.1	1.2	0.5374	0.5465
Dissolution time	14 min	14 min	11 min	15 min
Antimicrobial evaluation	12 mm	12 mm	21 mm	23 mm

Table 10: Formula for Scale-up Batch

Ingredients	E4	P4	G4
Extracts of Eucalyptus Volatile oil	4%	4%	4%
Extracts of Piper longum Volatile oil	4%	4%	4%
Lactose	30 mg	30 mg	30 mg
Gelatin	60 mg	60 mg	60 mg
Mannitol	200 mg	200 mg	200 mg
Sucrose	703 mg	703 mg	703 mg
Magnesium stearate	7 mg	7 mg	7 mg
Purified water	q.s	q.s	q.s

Table 11: Physical Stability Studies for Scale-up Batch

Physical Stability Evaluation Test	E4	P4	G4
Color	NCC	NCC	NCC
Odour	NCC	NCC	NCC
Taste	NCC	NCC	NCC
Hardness	NCC	NCC	NCC

NCC – No Characteristic Change

Table 12: Evaluation Tests for Scale-up Batch

Evaluation Test	E4	P4	G4
Hardness	5	5	5
Weight variation	Pass	Pass	Pass
Friability	0.6478	0.5247	0.5465
Dissolution time	14 min	15 min	15 min
Antimicrobial evaluation	21mm	16 mm	23 mm

Methodology

Magnesium stearate used to be bought from Wockhardt Limited, Aurangabad. Lactose, Mannitol, Gelatin, and Sucrose used to be frequent Pharmaceutics Private Limited, Mumbai, and other ingredients victimized in with Analytical grade.

Eucalyptus Volatile Oil Extraction

Eucalyptus leaves were gathered and dried in the shade for a week. The foliage was divided into small pieces (50gm), and distilled water (500ml) was used as the solvent throughout the distillation process, which took three to five hours. Oil recovered from the reservoir was kept in a refrigerator at 2-8^0 C. The extraction process was repeated twice [8, 9].

Volatile oil from Piper longum is extracted

Using 500ml of distilled water as the solvent during the distillation process in a Clevenger apparatus, fresh Piper longum leaves were cut into small pieces. The oil collected from the reservoir was refrigerated to 2-8^{0}C [10–12].

Lozenge preparation

Volatile oils were accurately weighed and transferred to a beaker, combined with lactose. The medication mixture was added, carefully mixed, and then put through sieve number 60 after Sucrose and mannitol had been measured and wholly pulverized. The gelatin was added to the mixture and triturated to create the necessary mass consistency. On a lozenge board, the bulk was rolled before being trimmed to size. In a hot air oven, the tablets were dried out [13–15].

Physical and chemical attributes

Physical stability, color, odor, taste, and other physicochemical characteristics are assessed.

Test for weight variation

Individual weights of the ten tablets were recorded, and the average weight of the tablets amounted has been calculated by dividing the overall weight by the number of pills. It was then contrasted with typical monographs.

Test of friability

Use a Roche friability at a 25 rpm speed.

Time for dissolution

Using the USP dissolving device, the dissolution time was estimated.

Lozenge *in vitro* antimicrobial evaluation

3 beakers received 25ml of sterile standard saline solution. Each cup of beads received three tablets containing a combination of Piper longum and Eucalyptus oil. The cups were then set on a magnetic stirrer. Five minutes, 10 minutes, and 15 minutes later, 1ml of solution were taken out. In sterile test tubes, the samples were kept. Gentamicin standard solution (40 mg/ml) was reduced to 0.6 μg/ml. C. albicans were pipetted into agar plates in 0.1 ml increments and hardened. A 4mm well was created, and a lozenges solution was added at varied intervals. As a control, a regular gentamicin solution was employed [16, 17]. The zone of inhibition is then evaluated after it has been incubated for 24 hours at 37°C [18–20].

RESULTS AND DISCUSSION

Piper longum and eucalyptus volatile oil extraction

Eucalyptus oil and Piper longum oil were extracted using the proper solvent as well as quantity of fat following the formula's instructions.

Formulation creation

50-lozenge trial batches took place, and the formulas are listed below. There were four formulations with eucalyptus oil alone (E1-E4) [Table 1], four formulations with piper longum alone (P1-P4) [Table 2], and four formulations with both eucalyptus oil and piper longum (G1-G4) [Tables 3 and 4].

E4, P4, and G4 were identified as the best formulations based on the evaluation criteria, and this formulation was utilized for the scale-up batch [Tables 5, 6, 7 and 8].

A tablet manufactured from eucalyptus and piper longum extract is to mask the flavor, releases a tiny amount of medication, and causes antimicrobial action. The product served as a highly efficient release schedule for such combined eucalyptus and piper longum extract due to its inhibitory efficiency against non-resistant C.albicans infections. It will take more investigation to properly standardize the mixture for the best antimicrobial effect without sacrificing the other good qualities of both eucalyptus and piper longum and to screen various fungi and bacteria from the local environment.

The tablets are excellent in terms of Hardness, friability, and weight variation, but disintegration time is qualities. As a result, it might be said that these lozenges are a suitable dosage form for administration and effective for several ailments. They can be used as single-extract lozenges or lozenges that combine both extracts [Tables 9, 10, 11 and 12].

CONCLUSION

A tablet made from eucalyptus and piper longum extract has been effectively developed to disguise the flavor, release a small amount of medication, and cause microbiological resistance. The product's inhibiting effectiveness against C.albicans infections that are not resistant made it a great release chart for such a combination extract of eucalyptus and piper longum. Further research is necessary to thoroughly standardize the mixture for optimal antimicrobial action without endangering another beneficial characteristic of Eucalyptus or Piper longum, nor to screening different fungi and bacteria from the local environment. Regarding qualities such as weight variation, disintegration time, friability, and Hardness, tablets are good quality. Consequently, it can be concluded that these lozenges are an appropriate dosage form for administration and can be used for various conditions. They can be used like tablets with only one extract as lozenges combining those extracts.

ACKNOWLEDGEMENTS

The authors are thankful to the Secretary & Correspondent & Principal of Jagan's Institute of Pharmaceutical Sciences, Jangalakandriga (V), Muthukur (M) Nellore-524 346, SPSR Nellore (Dist) Andhra Pradesh, for providing the necessary facilities to carry out this work.

Conflict of Interest

The authors attest that they have no conflict of interest in this study.

Funding support

No financial support for the current study.

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Cite this article: Venkata Durga Seshu Priya, Ramesh Babu K, Marri Rajasekhar, Minuku Sushma, Mogiligunta Maneesha, Mynampati Parameshwar, Pathan Habeebunnisa. **Synthesis and Assessment of Herbal Lozenges Manufactured from *Piper Longum* and Eucalyptus Leaves that Contain Volatile Oil**. Future J. Pharm. Health. Sci. 2023; 3(2): 134-140.