International Journal of Natural Products and Alternative Medicine (IJNPAM)
Website: https://ijnpam.com/
ISSN: 3107-3646
Vol. 2, Issue 1, January-June, 2026
Page No.: 49-53

Research

Formulation and Evaluation of Herbal Antiemetic Aromatherapy Roll-On

Jadhav Yash A*[1], Bhoye Kailas P[2], Damale Aviansh M[3], Yeole Yash R[4]and Dr Deepak B. Somavanshi[5]

[1-4]*Student of KBHSS Trust's Institute of Pharmacy, Malegaon, Nashik, Maharashtra*
[5]*Assistant Professor, KBHSS Trust's Institute of pharmacy, Malegaon, Nashik, Maharashtra*

Corresponding Author:
Jadhav Yash A

Email:
yashjadhav3709@gmail.com

DOI: *10.62896/ijnpam.2.1.08*

Conflict of interest: *NIL*

Article History
Received: 12/03/2026
Accepted: 22/04/2026
Published: 25/04/2026

Abstract:
This study focuses on the formulation and evaluation of a herbal antiemetic roll-on using essential oils derived from medicinal plants such as peppermint, ginger, lemon, and tulsi. Emesis (vomiting) is a complex physiological response triggered by various stimuli, including gastrointestinal irritation, motion sickness, pregnancy, and chemotherapy. Conventional antiemetic drugs, although effective, are often associated with adverse effects, creating a need for safer, natural alternatives. Aromatherapy, a holistic therapeutic approach utilizing essential oils, offers potential benefits in managing nausea and vomiting through olfactory and transdermal mechanisms. The formulated roll-on was prepared using selected essential oils blended with a carrier oil and evaluated for physicochemical properties and in-vitro antiemetic activity using a 5-HT_3 receptor binding assay. The results demonstrated a dose-dependent inhibition of receptor binding, with a significant IC_{50} value of 3.56 µg/mL, indicating promising antiemetic potential. The formulation exhibited comparable activity to standard drugs like ondansetron, suggesting its effectiveness as a natural alternative. Overall, the study highlights the therapeutic potential of herbal aromatherapy-based formulations in managing nausea and vomiting, with advantages such as improved patient compliance, reduced side effects, and ease of application. Further in-vivo and clinical studies are recommended to validate these findings.

Keywords: Emesis, Antiemetic, Aromatherapy, Essential oils, 5-HT_3 receptor, Peppermint, Ginger.

INTRODUCTION

Emesis is an unpleasant activity that results in the expulsion of stomach contents through the mouth and clearly associated with gastrointestinal motor activity. It is a response of biological systems for drug side effects, disease co-morbidities and defence against food poisoning. The current anti-emetic drugs to control nausea and vomiting can be classified as anti-dopaminergic drugs, serotonin antagonists, antihistamines, anticholinergic drugs, corticosteroids, NK_1-receptor inhibitors, cannabinoids, 5-HT1A, GABAB and CB_1- receptors agonists. The side effects of these anti-emetic drugs are given much attention to the application of traditional medicines. There is a need to concentrate on all folk natural products useful in emesis for their pharmacological evaluation, isolating single drug entity responsible for anti-emetic effect and developing suitable formulation used against emesis [1].

Antiemetics are drugs used to prevent or treat nausea and vomiting (emesis) by blocking the receptors or pathways that trigger the vomiting reflex in the brain and gastrointestinal tract. Vomiting is controlled by the vomiting center located in the Medulla Oblongata, which receives signals from the Chemoreceptor Trigger Zone (CTZ), gastrointestinal tract, vestibular system, and higher brain centers [2,3].

Mechanism of Action (MOA) of Antiemetic Drugs

Antiemetic drugs act by blocking specific neurotransmitter receptors involved in the vomiting

reflex pathway [4].

The essential oils are extracted mainly from plant source through various methods like steam distillation and cold pressing methods by which they capture the plant‟s aroma and therapeutic properties [5]. There is numerous health benefits to the natural compounds found in these concentrated volatile oils. The use of aromatherapy in ancient traditions for physical and mental health benefits have been rooted in modern holistic health [6]. Some of the essential oils namely tea tree oil, lavender oil, eucalyptus oil, have unique properties that can able to calm our mind, support the body‟s natural healing processes and alleviate stress [7,8]. These oils are also used for many purposes like massage therapies, inhalation, and diffusion, to overcome the problems like anxiety, insomnia, and respiratory discomfort [9].

Table 1: Anti-emetic plants used in different parts of the world

Sr.no	Botanical name	Common name	Part of plant	Extracts
1	Citrus limon	Lemon	Fruits	Cold- pressed / expressed Extract
2	Ocimum sanctum	Holy Basil	Leaves	Ethanolic extract
3	*Mentha piperita*	Peppermint	Leaves	Steam distilled extract
4	*Zingiber officinale*	Ginger	Rhizomes	Ethanolic extract

MATERIAL AND METHOD:

1) ***Ocimum sanctum*:**

Figure No. 1 Leaves of *Ocimum sanctum* L

Tulsi (*Ocimum sanctum*) exhibits mild to moderate antiemetic activity due to its essential oils and phytochemicals. It is best used as a supportive natural remedy for minor nausea and digestive discomfort rather than a primary treatment for severe vomiting [10].

2) ***Citrus limon*:**

Figure No. 2 Fruit of *Citrus limon* L

Citrus limon shows mild antiemetic activity due to its essential oils and organic acids. It is widely used as a safe, natural remedy for everyday nausea, especially in pregnancy and digestive discomfort [11].

3) ***Mentha piperita*:**

Figure No. 3 Leaves of *Mentha piperita* L

Mentha piperita exhibits effective mild antiemetic activity, mainly due to menthol and its antispasmodic effects. It is widely used as a natural remedy for nausea, especially related to digestion, motion sickness, and minor illnesses [11].

4) ***Zingiber officinale*:**

Figure No. 4 Rhizomes of *Zingiber officinale* L

Zingiber officinale shows strong antiemetic activity, supported by both traditional use and modern clinical studies. It works via multiple mechanisms and is one

of the best natural remedies for nausea and vomiting, though severe cases still require standard drugs [12].

FORMULATION TABLE:

Table 2: Formulation table

Sr. No.	Ingredients	F1 (ml)	F2 (ml)	F3 (ml)	F4 (ml)	F5 (ml)	Role
1	Peppermint essential oil	0.30	0.25	0.35	0.05	0.20	Antiemetic, relieves nausea
2	Lemon essential oil	0.20	0.15	0.25	0.15	0.35	Reduce nausea, refreshes mind
3	Ginger essential oil	0.15	0.20	0.20	0.20	0.10	Strong antiemetic, relieves motion sickness.
4	Tulsi essential oil	0.05	0.10	0.10	0.30	0.20	Anti-nausea, adaptogenic,
5	Fractionated coconut oil (MCT)	9.20	9.20	9.00	9.20	9.00	Carrier oil, dilutes essential oil
6	Vitamin E (tocopherol)	0.10	0.10	0.10	0.10	0.10	Antioxidant, prevent oxidation of oils.

PROCUDURE:

First all ingredients were accurately weighed/measured.

↓

Essential oils taken: Peppermint oil, Lemon oil, Ginger oil, Tulsi oil (in required quantity)

↓

Carrier oil (Coconut oil/ Almond oil) was taken in a clean dry beaker.

↓

Add measured quantity of essential oils to the carrier oil.

↓

Add Vitamin E (as antioxidant) to the mixture.

↓

Mix all the ingredients gently to obtain a uniform solution.

↓

Avoid addition of water to prevent instability and phase separation.

↓

Check clarity and ensure no particulate matter is present.

↓

Transfer the prepared solution into a clean, dry roll-on bottle.

↓

Close the container tightly and shake gently for proper mixing.

↓

Label the product properly (name, date, composition, use).

↓

Store in a cool, dry place away from direct sunlight

RESULT AND DISCUSSION:

pH Determination:

The pH of the herbal antiemetic aromatherapy roll-on formulation was measured using a calibrated digital pH meter. Since the formulation is oil-based, 1 ml of the sample was dispersed in 10 ml of distilled water (or ethanol-water mixture) to obtain a measurable solution. The electrode was immersed in the prepared sample at room temperature and the pH was recorded. Acceptable range: 5.5 (5.0-6.5 optimum range)[13]

IN-VITRO **[5-HT_3 Receptor Binding Assay (In-vitro)]**

Materials

a. Herbal formulation containing essential oils (Peppermint oil, Lemon oil, Ginger oil, Tulsi oil)
b. Radioligand: [^{3}H]-Granisetron (selective 5-HT_3 antagonist)
c. Membrane preparation: HEK-293 cells expressing human 5-HT_3 receptors
d. Standard drug: Ondansetron
e. Buffer: Tris-HCl (50 mM, pH 7.4)

Preparation of Test Samples

The herbal formulation was dissolved in dimethyl sulfoxide (DMSO) solution and diluted with Tris-HCl (50 mM, pH 7.4) buffer to obtain concentrations ranging from 1–100 µg/mL. **Assay Procedure**

- Membrane fractions (containing 5-HT_3 receptors) were incubated with [^{3}H]-Granisetron in the presence or absence of test samples.
- Incubation was carried out at 25°C for 60 min with gentle agitation.
- Non-specific binding was determined using excess 10µm ondansetron.
- The reaction was initiated by adding cell membranes (10-20 µg of protein per well). The reaction was terminated by rapid filtration using 96-well filter plates (GF/B) filters.
- Radioactivity was measured using a liquid scintillation counter.
- Percentage inhibition of radioligand binding was calculated.
- IC_{50} values were determined using nonlinear regression analysis.

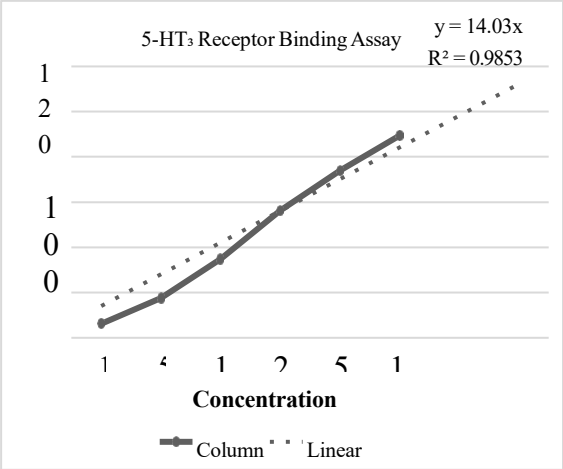
Table 3: Binding Inhibition Data

Concentration (µg/mL)	% Inhibition (Mean ± SD, n=3)
1	6.2 ± 0.8
5	17.5 ± 1.2
10	34.8 ± 1.6
25	56.3 ± 2.1
50	73.9 ± 1.8
100	89.4 ± 2.3

- The herbal formulation showed dose-dependent inhibition of 5-HT$_3$ receptor binding.
- The calculated IC$_{50}$ value was 3.56 µg/mL.

Graphical Representation

Below is the dose-response relationship:



Stability Testing:

Procedure:

The prepared herbal antiemetic aromatherapy roll-on was subjected to stability studies under different storage conditions to evaluate its physical and chemical stability. The formulation was filled in suitable glass roll-on containers and stored at:

- Room temperature (25±2°C)
- Refrigerated condition (4±2°C)
- Accelerated condition (40±2°C, 75% RH)

The samples were observed at regular intervals (0, 7, 15, and 30 days) for any changes.

Parameters evaluated: Colour, Odour, Clarity, Phase separation and Ph.

Table 4: Observations

Sr. No	Parameters	Initial	7 Days	15 Days
1	Colour	No Change	No Change	No Change
2	Odour	No Change	No Change	No Change
3	Clarity	Clear	Clear	Clear
4	Phase Separation	Absent	Absent	Absent
5	pH	5.6	5.6	5.5

The formulation remained stable under all storage conditions with no significant change in physical parameters. Hence, the herbal antiemetic aromatherapy roll-on was found to be stable and suitable for use.

Figure No.5 Herbal Roll-On(Emetica Roll-On)

Discussion

The present study demonstrates that the herbal formulation containing volatile oils (Peppermint oil, Lemon oil, Ginger oil, Tulsi oil) exhibits significant affinity toward 5-HT$_3$ receptors, indicating its potential antiemetic activity. The inhibition of radioligand binding by [^{3}H]- Granisetron suggests that the formulation may act as a competitive antagonist at the 5-HT$_3$ receptor, similar to standard antiemetic drugs like ondansetron.

The observed dose-dependent inhibition supports the pharmacological relevance of volatile oil constituents, which are known to contain bioactive compounds such as terpenoids and phenolics. These compounds may interact with receptor binding sites through hydrophobic and hydrogen-bonding interactions, contributing to receptor modulation.

The IC$_{50}$ value (3.56 µg/mL) indicates moderate potency as compare with IC$_{50}$ value for Ondansetron is 53.56 µg/mL, which is promising for herbal formulation. Compared to synthetic drugs, the formulation may offer advantages such as reduced side effects and better patient compliance, although further validation is required.

Limitations of the Study:

- Lack of receptor subtype specificity analysis
- Absence of in-vivo correlation
- Possible variability due to complex phytochemical composition

Further studies involving **molecular docking, in-vivo antiemetic models, and isolation of active constituents** have the future scope.

CONCLUSION:

The present study successfully focused on the

formulation and evaluation of a herbal antiemetic roll-on using selected medicinal plants and essential oils known for their antiemetic properties. Nausea and vomiting remain common clinical problems despite the availability of modern antiemetic drugs, which often produce undesirable side effects. Hence, the development of a natural, safe, and effective alternative was emphasized. The selected ingredients such as peppermint, ginger, lemon, and tulsi oils were chosen based on their traditional use and scientific evidence supporting their antiemetic activity. The formulated roll-on showed acceptable physicochemical properties, including appropriate pH, stability, homogeneity, and ease of application. Aromatherapy-based delivery through inhalation and topical application provides rapid relief by acting on the limbic system and gastrointestinal pathways. The formulation also demonstrated advantages such as portability, convenience, and better patient compliance compared to oral dosage forms. Overall, the herbal antiemetic roll-on can be considered a promising complementary therapy for managing nausea and vomiting. Further in-vitro and clinical studies are recommended to establish its efficacy, safety, and long-term stability on a larger scale.

The herbal formulation containing volatile oils (Peppermint oil, Lemon oil, Ginger oil, Tulsi oil) exhibited significant inhibitory activity against 5-HT_3 receptor binding in vitro, demonstrating a clear dose-dependent response. The findings suggest that the formulation possesses promising antiemetic potential, likely mediated through antagonism of serotonin receptors. The moderate IC_{50} value highlights its potential as a natural alternative to conventional antiemetic agents. However, further pharmacological and clinical investigations are necessary to confirm its efficacy, safety, and mechanism of action.

REFERENCES:

1. Ahmed S, Hasan MM, Ahmed SW. Natural antiemetics: an overview. Pak J Pharm Sci. 2014;27(5):1583–1598.
2. Tripathi KD. Essentials of Medical Pharmacology. 8th ed. New Delhi: Jaypee Brothers; 2019. p. 639–645.
3. Brunton LL, Hilal-Dandan R, Knollmann BC. Goodman & Gilman's The Pharmacological Basis of Therapeutics. 13th ed. New York: McGraw-Hill; 2018. p. 1012–1018.
4. Katzung BG. Basic and Clinical Pharmacology. 15th ed. New York: McGraw-Hill; 2021. p. 1092–1098.
5. Panda S, et al. Essential oils and their pharmacotherapeutic applications in human diseases. Adv Tradit Med. 2020:1–15.
6. Liang J, et al. Essential oils: chemical constituents, potential neuropharmacological effects and aromatherapy—a review. Pharmacol Res Mod Chin Med. 2023;6:100210.
7. Rowland E. The healing power of scent: a beginner's guide to the power of essential oils. David and Charles; 2024.
8. Vora LK, et al. Essential oils for clinical aromatherapy: a comprehensive review. J Ethnopharmacol. 2024:118180.
9. Heshelow E. Essential oils book for beginners: improve sleep, energy, digestion, skin, and immune system by understanding the power of essential oils and the basics and science behind it. 2023.
10. Pattanayak P, Behera P, Das D, Panda SK. *Ocimum sanctum* Linn. A reservoir plant for therapeutic applications: an overview. Pharmacogn Rev. 2010;4(7):95-105.
11. Vigneswari R, Renugaadevi R, Raxshiya Smily J. Preparation and evaluation of antiemetic herbal roll-on. World J Pharm Sci. 2025;13(1):151-162.
12. Ali BH, Blunden G, Tanira MO, Nemmar A. Some phytochemical, pharmacological and toxicological properties of ginger: a review of recent research. Food Chem Toxicol. 2008;46(2):409-420.

*****