Formulation and Evaluation of Aromatherapy Roll-On Combining Lemongrass Oil (*Cymbopogon winterianus*) and Peppermint Oil (*Mentha piperita* L.)

Nuradnin Hasan[1], Siti Mutripah[2], Muhammad Heykal Putra[3]
[1,2,3]Program Diploma Farmasi, Akademi Farmasi Kusuma Husada Purwokerto, Indonesia

Aromatherapy is a method of treatment using scents derived from essential oils. Lemongrass oil can be used in aromatherapy because it has calming properties. Peppermint oil contains the main compound menthol, which is useful as a diuretic, antispasmodic, antiinfective, analgesic, and anxiety reliever. This study aims to formulate and evaluate a roll on aromatherapy combination of lemongrass oil and peppermint oil. The combination of lemongrass oil and peppermint oil was formulated in the form of a roll-on aromatherapy preparation, then evaluated for its physical properties, including organoleptic, homogeneity, pH, and hedonic tests. The results show that the combination of lemongrass oil and peppermint oil can be formulated into an aromatherapy roll on preparation with homogeneous physical properties, a clear yellowish color, a lemongrass aroma, a liquid consistency, and a warm and cool taste or sensation, as well as a pH of 6. In the hedonic test, the preparation received good and acceptable scores from respondents for color, consistency, and taste or sensation. Therefore, it can be concluded that lemongrass oil and peppermint oil can be formulated into an aromatherapy roll on preparation and meet the evaluation standards for aromatherapy roll on preparations.
Keywords: Lemongrass oil, Peppermint oil, Aromatherapy, Physical properties of preparations.

Corresponding Author:
Nuradnin Hasan
Akademi Farmasi Kusuma Husada Purwokerto
Jl. Gerilya No.12, Windusara, Karangklesem, Kec. Purwokerto Sel., Kabupaten Banyumas, Jawa Tengah 53144
adnin@kusumahusada.ac.id

1. Introduction

Indonesia is a country rich in various types of flora and fauna (Aina et al., 2023), one of which is rich in essential oil producers. Indonesia is recorded as having 40-50 plants that produce essential oils (Yulia et al., 2024). Essential oils are natural by-products that are very attractive and of high quality because they have various biological activities. Natural essential oils are volatile oils with a pleasant aroma and taste, obtained from leaves, roots, flowers, seeds, and fruits. Essential oils have been used in perfumes, cosmetics, and the pharmaceutical industry (Ali et al., 2017).

Aromatherapy is a treatment method that uses scents derived from essential oils (Ulvira et al., 2024). Aromatherapy is a complementary treatment that uses essential oils as the main therapeutic agent. Essential oils are obtained from the extraction of flowers, leaves, stems, fruits, roots, and also from resin. Essential oils used in aromatherapy are administered through inhalation or topical application. When inhaled, essential oils act on the brain and nervous system through stimulation of the olfactory nerves. This response stimulates the production of brain neurotransmitters associated with the restoration of psychological conditions such as emotions, feelings, thoughts, and desires (Sundara, 2022). The use of aromatherapy is currently very popular among the public because it can be used as a medium to reduce symptoms such as nausea and dizziness or as a medium to calm the mind (relaxation), especially in the form of aromatherapy roll-ons (Sofiyana et al., 2023).

Lemongrass, commonly known as serei, is a plant cultivated in India and Brazil. This plant has various benefits, including as an antimicrobicide, acaricide (Oliveira et al., 2015), anti-inflammatory, antioxidant (Tavares et al., 2021), antiseptic, antispasmodic, diuretic, and antipyretic properties (Carolin et al., 2023). Lemongrass contains two main compounds, citronellal and geraniol, which give the essential oil its intense aroma, scent, and value. Lemongrass oil can be used in aromatherapy because of its calming properties (Yulia et al., 2024). Lemongrass is an aromatherapy that provides relaxation, anti-neurodepressant, and sedative effects for people with insomnia, improves mood, reduces anxiety levels, and increases alertness (Idhayanti et al., 2022).

In addition to lemongrass oil, peppermint oil can also be used for aromatherapy. Peppermint is an aromatic plant belonging to the Lamiaceae family. Peppermint is a plant that is often used in flavorings, fragrances, and pharmaceutical applications (Sundara et al., 2022). The main component of peppermint is menthol, which is useful as a diuretic, antispasmodic, anti-infective, analgesic, and anxiety reliever (Ayu et al., 2023). Based on research by Shintawati et al. (2020), it was reported that lemongrass oil and peppermint oil in certain proportions produced aromatherapy that was preferred by the panelists (Shintawati et al., 2020). In a study by Kireinal & Maulina (2024), it was shown that a combination of peppermint oil and lime oil as aromatherapy candles provided a therapeutic effect that was preferred by respondents (Kireina & Maulina, 2024). Based on this background, this study aims to formulate and evaluate a roll on aromatherapy combining lemongrass oil (*Cymbopogon winterianus*) and peppermint oil (*Mentha piperita* L.).

2. Methods

1. Tools and materials
   The tools used are a stirring rod, measuring cup, mortar, pH meter, stamper, analytical balance, and roll-on container. The materials used are distilled water, lemongrass oil, and peppermint oil obtained from PT. Syailendra Bumi Investama, menthol, camphor, and propylene glycol.
2. Preparation of roll on aromatherapy
   Lemongrass oil and peppermint oil were used as active ingredients in the preparation of roll on aromatherapy. The preparation began with the preparation of the tools and materials to be used. Menthol and camphor were dissolved in lemongrass oil, then peppermint oil was added and ground until dissolved. The mixture was placed in a container and evaluated.

Table 1. Formulation design for aromatherapy roll on preparations

Ingredient	Volume (mL)	Usage
Lemongrass oil	0.5	Active ingredient
Peppermint oil	0.5	Active ingredient
Menthol	0.5	Cooling agent
Camphor	0.5	Anti-irritant

3. Evaluation of roll on aromatherapy preparations
   a. Organoleptic testing
      Organoleptic testing is carried out by visually observing the physical appearance of the preparation, including its shape, color, smell, and taste (Hasan, 2025).
   b. Homogeneity
      The homogeneity test was conducted using two glass slides. The preparation was placed evenly on one of the glass slides and observed. A good preparation should be homogeneous and free of coarse particles (Khaira et al., 2022).
   c. pH Test

This test is performed by dipping a pH meter into the preparation (Hasan et al., 2024). The pH test is performed to ensure that the preparation will not cause skin irritation when used and is in accordance with the skin pH standard, which is between 4.5-6.5 (Fachriansyah et al., 2021).

d. Hedonic Test
The hedonic (liking) test was conducted visually on 30 respondents. The observation parameters in the hedonic test were aroma, color, and the sensation of warmth felt on the skin. Respondents were then asked to provide their personal responses regarding their liking For preparations, the results obtained based on each parameter were used on a numerical scale (Ticoalu et al., 2024).

3. Results and Discussion

The evaluation of the roll-on aromatherapy

The evaluation of the roll-on aromatherapy preparation combining lemongrass oil and peppermint oil aims to determine the quality of the preparation based on parameters in accordance with the quality testing standards for roll on aromatherapy preparations (Hasan et al., 2023). The evaluation of the preparation was carried out through organoleptic testing, homogeneity testing, pH testing, and hedonic testing. The results of the product evaluation are presented in Table 2.

Table 2. Results of the evaluation of the roll-on aromatherapy product combining lemongrass oil and peppermint oil

Aromatherapy roll on preparations			
Testing	**Replication 1**	**Replication 2**	**Replication 3**
Organoleptic			
Color	Clear yellowish	Clear yellowish	Clear yellowish
Smell	Lemongrass oil	Lemongrass oil	Lemongrass oil
Shape	Liquid	Liquid	Liquid
Taste	Warm & cold	Warm & cold	Warm & cold
Homogeneity	Homogeneous	Homogeneous	Homogeneous
pH	6	6	6

a. Organoleptic testing
Organoleptic testing, also known as sensory testing, uses the human senses to measure product acceptance (Yunita et al., 2025). Based on the organoleptic test results in Table 2, the roll-on aromatherapy preparation with three replicates had a clear yellowish color, smelled of lemongrass oil, was liquid in form, and had a refreshing and cooling sensation or taste. The natural scent of lemongrass oil can relieve nervous exhaustion, migraines, and headaches. In addition, lemongrass oil also provides a warm sensation with a distinctive lemon scent. Peppermint oil can provide a menthol scent with a low level of warmth (Shintawati et al., 2020).

b. homogeneity test
A homogeneity test was conducted to determine whether the ingredients used were well mixed or homogeneous in the preparation. The preparation was declared homogeneous if there were no coarse particles or grains during testing (Putriyanti et al., 2024). Based on the homogeneity test results, the preparation has a homogeneous texture, as shown in Table 2. A homogeneous preparation will produce good quality because it shows that the ingredients are well dispersed. Ingredients that are not well dispersed will not achieve the desired therapeutic effect (Ticoalu et al., 2024).

c. pH test

pH testing is one of the tests required to determine the safety of preparations. Preparations with low pH values can cause skin irritation, while those with pH values that are too high can cause dry or flaky skin (Pauang et al., 2025). The pH test of the roll-on aromatherapy preparation showed that the pH value of the preparation was 6, which falls within the skin pH category of 4.5-6.5 (Hasan et al., 2024).

d. Hedonic test

Hedonic testing or preference testing is a type of acceptance test that involves volunteers or panelists evaluating a product. The results of the hedonic test are presented in Table 3.

Table 3. Results of the hedonic test of the roll-on aromatherapy preparation combining lemongrass oil and peppermint oil

Rating	Criteria	Number of respondents
Consistency	Strong dislike	0
	Dislike	0
	Like	18
	Strong like	12
Color	Strong dislike	0
	Dislike	0
	Like	30
	Strong like	0
Smell	Strong dislike	8
	Dislike	12
	Like	10
	Strong like	0
Taste	Strong dislike	0
	Dislike	5
	Like	16
	Strong like	9

Hedonic testing aims to determine the level of consumer acceptance of the roll-on aromatherapy products produced (Lestari et al., 2017). The parameters are appearance or color, smell or aroma, and shape or consistency (Lestari et al., 2019). Based on the results of the hedonic test in Table 4, it shows that the respondents' preference for the consistency of the preparation is 18 like and 12 very like. This is because the consistency of the preparation is liquid and homogeneous. In assessing the color of the preparation, all respondents liked the clear, yellowish color. The results of the aroma or smell assessment showed that 8 respondents disliked it very much, 12 disliked it, and 10 liked it. The aroma of the preparation was not well received by respondents because the combination of lemongrass oil and peppermint oil produced a very pungent smell. The taste or sensation of the preparation received positive ratings from respondents, with 16 liking it and 9 really liking it. When the preparation was applied to the skin, it produced a cooling and warming sensation due to the menthol and lemongrass oil content in the preparation.

4. Conclusion

Based on the results of the study, it was concluded that a combination of lemongrass oil and basil oil can be formulated into an aromatherapy roll-on preparation with organoleptic physical properties, including a clear yellowish color, lemongrass scent, liquid form, and a cool, refreshing taste. The resulting roll-on aromatherapy preparation is homogeneous with a pH value of 6, while the hedonic test received positive responses from respondents. Readers are advised to develop this research by adding fragrances to the roll-

on aromatherapy preparation of lemongrass oil and peppermint oil so that the hedonic test response to the scent of the preparation is maximized.

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