

## FORMULATION OF LIQUID BATH SOAP PREPARATION USING ETHANOL EXTRACT OF KOMBA-KOMBA LEAF (*Chromolaena odorata L.*)

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### A B S T R A C T

**Background:** The background of this research is based on the potential of komba-komba leaves as a natural ingredient that can be processed into cosmetic products. Liquid bath soap preparations are formulated in three variations of extract concentrations, namely 20%, 30%, and 40%. This study aims to formulate a liquid bath soap preparation that utilizes ethanol extract from the leaves of komba-komba (*Chromolaena odorata L.*). The research method used is quantitative experimental with the formulation of preparations and evaluation of the quality characteristics of the resulting soap products. The results of the study showed that liquid bath soap preparations formulated with komba-komba leaf ethanol extract at all three concentrations were successfully made with characteristics that met quality standards. The conclusion of this study is that komba-komba leaf ethanol extract has significant potential to be used as a raw material in the manufacture of liquid bath soap products.

## INTRODUCTION

Although Indonesian plant medicines are still not fully utilized for health. Medicinal plants, which are made from generation to generation, are a popular dish in Indonesia that dates back to the time of our ancestors. Plants are one of the various types of medicinal plants that are being re-researched and transformed into contemporary items as a result of the development of knowledge and technology, namely the komba-komba leaf plant (Wasito, 2008).

Plant *Komba-komba camara L.* is a plant that is empirically used by people in Southeast Sulawesi to heal wounds. Based on phytochemical tests, it is revealed that ethanol extract of *L. camara* leaves and its fractions has content and antioxidants according to (Teheni *et al.*, 2023). Antioxidants are substances that can prevent or slow down cell damage due to free radicals. The komba-komba plant contains alkaloid compounds, flavonoids, tannins, triterpenoids, saponins and steroids, saponins that play a role in the wound healing process and are used as wound medicine (Mustiqawati *et al.*, 2023). Tannins as an astringent that can stop bleeding, speed up wound healing and as inflammation (Hakim *et al.*, 2021).

In various societies, this plant is also often used as a wound medicine. (Thamrin, 2013). Beluntas and komba-komba are wild plants that are often considered nuisance plants because they are widely found on agricultural or residential land. (Murdaningsih & Mbu'u, 2014)

In previous research, komba-komba plants were used by local communities as wound medicine but the use of komba-komba leaves is not only limited as medicine, komba-komba leaves can also be used as raw materials for herbicide paper and vegetable insecticides (Tala *et al.*, 2021).

The human skin is the outermost and largest organ of the body. Its function is for the outer layer of the body. (Brodell & Rosenthal, 2008). The human body is a part that is protected by the skin from impact, pull, pressure, temperature, and radiation or UV rays (Rasyadi *et al.*, 2019).

An attempt or way to keep the skin clean and healthy by bathing regularly. In this day and age, bathing is not only to cleanse the body but also to keep the skin healthy from dust (Octora *et al.*, 2020).

Soap is a type of pharmaceutical preparation that can be used to maintain healthy skin. Antiseptic soap can kill germs and meet two conditions. First, the soap should be able to remove dirt and bacteria, and second, the skin should not be damaging because healthy skin is part of the immune system. (Lestari *et al.*, 2020).

People often use bath soap as a cleaning tool. The need for this product continues to increase as the population increases (Adiwibowo *et al.*, 2020). Liquid soap is effective in removing impurities on the surface of the skin, both water-soluble and fat-soluble, as well as removing unpleasant odors from the skin and providing a pleasant smell (Zagita *et al.*, 2021).

Soap is one of the longest known cosmetics known by humans and is a skin cleanser used in addition to cleansing and to make the skin smell. (Mauliana, 2016). Testing the type weight using a Piknometer, the value of the type weight is influenced by a constituent material and its physical properties (Hutauruk *et al.*, 2020).

## METHOD

This type of research is quantitative in a laboratory experimental method with the formulation of liquid bath soap preparations using ethanol extract from the leaves of komba-komba (*Chromolaena odorata L.*).

The tools used in this study are Blender, jar, balance, analytical, hot plate, stirring rod, measuring cup, chemical cup, filter paper, pH meter, pipette, scissors, petri dish, microtube, autoclave, enlenmeyer, bar, spatula, container, camera, Laminar Air Flow (LAF), test tube, pecandang, pingset, handscoon, mask.

The work procedure is the preparation of simplicia, the manufacture of extracts (at the integrated chemistry laboratory of the Bina Husada Kendari Polytechnic), the formulation of liquid bath soap preparations and physical preparation tests (at the Baubau Polytechnic pharmaceutical laboratory).

The physical preparation test on liquid bath soap consists of 5 tests, namely, organoleptic testing, homogeneity testing, pH testing, foaming power testing and hedonic testing

## RESULTS & DISCUSSION

### Organoleptic Test Results

In the organoleptic test study, it was carried out to determine the physical characteristics of liquid bath soap preparations including the shape, color and aroma of the preparations that have been made, which can be seen in table 1.

**Table 1.** Results of organoleptic test research

|                 | Shape  | Color       | Aroma       |
|-----------------|--------|-------------|-------------|
| Formulation     |        |             |             |
| Formulation I   | Liquid | Light green | Distinctive |
| Formulation II  | Liquid | Green       | Distinctive |
| Formulation III | Liquid | Deep green  | Distinctive |

Source: Primary data (2025)

### pH Test Results

A pH test was carried out on each formulation of komba-komba leaf extract soap (*Chromolaena odorata L.*) with pH meter.

**Table 2.** pH Test Results

| Formulation   | Ph   | pH standard of liquid bath soap |
|---------------|------|---------------------------------|
| Formulation 1 | 7,13 | 8-11                            |
| Formulation 2 | 7,13 | 8-11                            |

|                  |      |      |
|------------------|------|------|
| Formulation<br>3 | 9,18 | 8-11 |
|------------------|------|------|

Source: Primary data (2025)

### Homogeneity Test Results

The chromidine homogeneity test was carried out evenly and thinly applied to transparent glass showing a homogeneous arrangement and not.

**Table 3.** Homogeneity Test Results

| Formulation   | Homogeneity |
|---------------|-------------|
| Formulation 1 | Homogeneous |
| Formulation 2 | Homogeneous |
| Formulation 3 | Homogeneous |

Source: Primary data (2025)

### Hedonic Test Results

This test was carried out by giving questionnaires to 15 panelists. The questionnaire given contains questions about the overall preparation of liquid bath soap by containing 4 scales, namely, Not like, somewhat dislike, somewhat like and like.

**Table 4.** Results of the test of likability for liquid bath soap

| Yes | Sample Name | Parameters   | Dislike | Somewhat dislike | Quite like it | like |
|-----|-------------|--------------|---------|------------------|---------------|------|
| 1.  | Formula I   | Color        | -       | 7                | 8             | -    |
|     | Formula II  |              | -       | 1                | 13            | 1    |
|     | Formula III |              | -       | -                | 7             | 8    |
| 2.  | Formula I   | Aroma        | -       | -                | 1             | 14   |
|     | Formula II  |              | -       | 2                | 6             | 7    |
|     | Formula III |              | 1       | 3                | 7             | 5    |
| 3.  | Formula I   | Lots of foam | -       | 3                | 5             | 7    |
|     | Formula II  |              | -       | 5                | 4             | 6    |
|     | Formula III |              | 3       | 5                | 5             | 2    |
| 4.  | Formula I   | Viscosity    | -       | 3                | 11            | 1    |
|     | Formula II  |              | -       | 2                | 10            | 3    |
|     | Formula III |              | -       | -                | -             | 7    |

Source: Primary Data (2025)

### Foam High Test Results

In this test, 1 gram of liquid bath soap is put into a scale tube containing 10 mL of aquadest and then closed, the tube is shaken for 20 seconds and the foam height is calculated.

#### 1. Foam High test results

**Table 5** Foam height test results

| Formulation          | Foam Height (mm) | High standard liquid bath soap foam |
|----------------------|------------------|-------------------------------------|
| <b>Formulation 1</b> | 240 mm           | 13mm-220mm                          |
| <b>Formulation 2</b> | 200 mm           | 13mm-220mm                          |
| <b>Formulation 3</b> | 140 mm           | 13mm-220mm                          |

Source: Primary data (2025)

## DISCUSSION

This study aims to formulate a liquid bath soap preparation that utilizes the potential of ethanol extract of komba-komba leaves (*Chromolaena odorata L.*) as a functional agent. The formulation was designed in three variants with different extracts concentrations (20%, 30%, and 40%) to evaluate the effect of concentration on physical characteristics and product acceptance. The results obtained from a series of physical evaluation tests and hedonic tests provide a clear picture of the feasibility of this product.

The results of organoleptic tests showed that the resulting liquid bath soap preparations had a homogeneous liquid consistency in all three formulas. However, significant differences are seen in the color parameters. Formula I (20% concentration) produces light green preparations, Formula II (30%) green, and Formula III (40%) deep green. This difference in color gradation is directly correlated positively with an increase in the concentration of komba-komba leaf extract. It can be explained scientifically that natural pigments, such as chlorophyll, contained in ethanol extracts of komba-komba leaves, make a major contribution to color intensity. The more extracts are added, the higher the concentration of the pigment in the formula, which is visually manifested as a more intense green color.

The degree of acidity (pH) is a critical parameter in the formulation of liquid body soap, as an inappropriate pH can cause irritation to the skin. The pH standard for safe and effective liquid bath soap is generally in the range of 8 to 11. The test results showed that Formula I and II had a pH below standard, namely 7.12 and 7.13 respectively. This near-neutral pH risks reducing the effectiveness of cleaning. Instead Formula III with a pH of 9.18 is within the required standard range, making it the most stable and safe formula in terms of pH. These results indicate that the concentration of the extract has a significant role in maintaining the pH of the product. Plant extracts often contain organic acid compounds that can affect the final pH of the preparation. In Formula I and II, a relatively low amount of extract may not be sufficient to stabilize the pH within the optimal base range, while in Formula III, a concentration of 40% extract seems to provide a buffer effect or better interaction with other ingredients in the formula to achieve the ideal pH which means that all preparations meet the pH test requirements of liquid soap preparations based on SNI 4085:2017 which ranges from pH 4.0-10,.

Foaming power is one of the important functional characteristics of liquid bath soap, as abundant lather is often associated with cleaning effectiveness and consumer satisfaction. A good foam power standard for liquid bath soap is between 13 mm to 220 mm. The results showed that all three formulas had excellent foaming power, even exceeding the standard on Formula I (240 mm). Formula II produces a foam height of 200 mm and Formula III produces 140 mm. The high foam produced by the three formulas indicates that Sodium Lauryl Sulfate (SLS) as a surfactant agent has worked effectively. However, there is a downward trend in foam height along with the increase in extract concentration. This phenomenon can be explained through several scientific mechanisms. Compounds in plant extracts, such as tannins, saponins, or polysaccharides, can interact with surfactant molecules (SLS). This interaction has the potential to disrupt the structure of the micelles responsible for foam formation, thereby reducing the stability and height of the foam formed. Nonetheless, the foaming power in Formula II and III is still within the acceptable standard range, suggesting that the formulation remains functional even with higher concentrations of extracts. Foam height test, measure is an easy way to put 1g of soap in a 20ml measuring cup plus 10ml aqua dest then cover shake for 20 seconds and calculated the height of the foam formed.

Homogeneity and stability tests are important to ensure the quality of the product and its shelf life. The test results showed that all three formulas were homogeneous, which means that all the constituent ingredients, including the extracts, were perfectly mixed in the absence of separate particles or deposits. This homogeneity reflects the success of the formulation method in creating a stable emulsion.

Hedonic tests provide valuable insights into consumer preferences for products. The results of these tests show that each formula has its own advantages. Formula II is most preferred in terms of color, perhaps because its green color is considered the most balanced and visually appealing. For aromas, Formula I dominates, suggesting that lower concentrations of extracts produce the most preferred scents. In terms of viscosity, Formula I and II were also preferred, which may indicate that the panelists preferred liquid bath soap with less concentrated viscosity. Interestingly, for foam attributes, all three formulas received a "like" rating, which confirms that the resulting foam power, although varied, is still considered satisfactory by consumers. These results show that although Formula III excels in terms of pH, other formulas have a stronger appeal in terms of aesthetics and consumer preferences.

According to a study conducted by the study, the concentration of ethanol extract from henna flower as a liquid bath soap preparation used in the previous study was also lower, namely 5%, 10%, and 15% while ethanol extract from the leaves of komba-komba (*Chromolaena odorata* L.) as a liquid bath soap preparation concentrates at 20%, 30%, and 40%. The goal is to prove the potential of komba-komba leaves as the main ingredient of soap, with results showing that the

product meets quality standards but uses different ingredients, namely ethanol extract from water henna flower specifically the main difference lies in the type of botanical ingredients used komba-komba leaves vs. water henna flowers as well as the range of extracts formulated.

## COVER

### Conclusion

This study succeeded in formulating a liquid bath soap preparation using ethanol extract from the leaves of komba-komba (*Chromolaena odorata* L.). This liquid bath soap preparation is made in three concentrations, namely 20%, 30%, and 40%. The results of the formulation show that the liquid bath soap produced has characteristics that meet the quality standard requirements, namely in formulation III. Thus, this study proves that komba-komba leaf extract has the potential to be used as the main ingredient in liquid bath soap products.

### Suggestion

Based on the findings of this study, some suggestions for further development are to further optimize Formula I and II to increase their pH to reach the standard range, for example by adjusting the composition of the soap base.

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