

## Original Research Article

# FORMULATION FACE MIST WITH GOTU KOLA (*Centella asiatica*) EXTRACT AS ANTIOXIDANT AND MOISTURIZING FOR ELDERLY SKIN

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### Abstract

**Background:** The skin in the elderly will experience structural, and physiological changes, and a decrease in the function of the skin, this is the basis for various skin disorders in the elderly or geriatric. The most common skin disorder in the elderly is dry skin. The gotu kola plant (*Centella asiatica*) has been studied to have antioxidant abilities. Face mist is included in skin fresheners or freshener cosmetics.

**Objectives:** The purpose of this study was to produce a face mist product with gotu kola extract in overcoming skin health problems in the elderly.

**Methods:** This research method begins with the manufacture of ethanol extract from gotu kola leaves, then gotu kola extract as the active ingredient in making face mist formulations. antioxidant activity of the gotu kola plant and the physical quality of the gotu kola leaf face mist was tested, namely the pH test and the organoleptic test.

**Results:** The organoleptic test obtained the characteristic odor of leaves, a liquid form with a brownish clear color. Furthermore, the pH test showed a pH range of 5. pH 5 is the pH of the preparation that is allowed for cosmetics used on the skin, especially on the face, as the pH of the skin in the Indonesian National Standard (SNI) is 4.5 - 7.5.

**Conclusion:** the formulation of this face mist is following the standard, it is hoped that this research can be continued for the development of research in increasing skin moisture levels in overcoming the skin of the elderly.

**Keywords:** Antioxidant, Face Mist, Gotu Kola

## INTRODUCTION

The skin will experience natural aging following the addition of age both internally and externally, this will be influenced by many environmental factors. The skin in the elderly will experience structural, and physiological changes, and decreased function of the skin,

this is the basis for various skin disorders in the elderly or geriatrics. Skin disease does not cause high rates of death in the elderly, how many skin problems occur in this elderly age group. This elderly skin disorder requires special attention in its handling. The most common skin disorder in the elderly is dry skin.

Physical changes seen to increase with age are changes in skin elasticity. One of the characteristics of aging, among others, is that the skin looks loose and black spots appear. This happens due to a decrease in water content, collagen becomes less becoming, thinning skin thickness, dryness of the skin, and also visible wrinkles (Ahmad & Damayanti, 2018). The aging process will affect various systems in the body and will result in decreased function of these systems. This is explained by the free molecule theory in which free radical compounds react with unsaturated fatty acids in cell membranes to form peroxidation compounds that prevent food pathways from entering and leaving the cell membrane, which leads to accelerated cell death (Damayanti, 2017).

Antioxidants can slow, delay, or inhibit oxidative reactions. Antioxidants are a very potential group that can prevent skin damage and reduce the level of skin damage (Damayanti, 2017). Sources of natural antioxidants can come from plants, one of which is gotu kola (*Centella asiatica*). One of the natural ingredients that have the potential as an antioxidant is gotu kola (*Centella asiatica* (L.) Urb). Hashim et al. in 2011 reported that the antioxidant activity of gotu kola was 84%, this is comparable to vitamin C (88%) and grape seeds (83%). Gotu Kola is a wild plant that grows naturally in fields, roadside, and rice fields. Gotu Kola contains compounds such as reducing sugars, flavonoids, terpenoids, tannins, alkaloids, steroids, and saponins. *Centella asiatica* is also rich in vitamin A, B vitamins, vitamin B2, niacin and carotene. *Centella asiatica* compounds that have the potential as antioxidants are flavonoids, terpenoids, and tannins (Salamah & Farahana, 2014).

In the skin of old people or the elderly, the production of sebaceous glands decreases, skin fat will decrease, drying or dehydration occurs more easily and also, and sweat production will decrease dramatically. Therefore, it is necessary to separate the skin care and cleansing methods of the elderly from the skin

of the young. Elderly care using cosmetics is primarily intended to overcome dryness. On the other hand, medically curative healing is more recommended for treating itching, reducing skin wrinkles, and also reducing circulatory disorders. To deal with dry skin in the elderly, the method is almost the same as other aged skin types, namely using moisturizers and emollients (Apristasari et al., 2018; Damayanti, 2017).

Face mist belongs to the category of skin freshener cosmetics, freshener function of a toner is to freshen facial skin, remove excess oil from the skin, and act as a gentle disinfectant while helping to close pores (Puspita et al., 2020; Taufiq & Ismail, 2020). Facial fresheners are made according to the type of cleanser that is based on the type of facial skin.

**Objective(s):** Based on the problems that have been presented, this study aims to provide a face mist preparation formulation with gotu kola ingredients that have the potential for antioxidants. *Centella asiatica* is made into ethanol extract. The ethanol extract of gotu kola obtained was formulated into a face mist preparation by comparing the composition of the active ingredients in the gotu kola extract and then testing the physical quality (Muhammad Ainul Yahya, 2020). Parameters observed in organoleptic testing, pH acidity testing, and density testing. Through the results of this study, it is hoped that information can be obtained about the preparation of a good gotu kola extract face mist, so that it can be utilized by the community. In addition, it can also increase the economic value Gotugotu kola which contributes to improving the community's economy.

## METHODS

### *Study Design*

The research design used cross-sectional.

### *Setting*

The research was conducted at the Pharmacy Laboratory of STIKes Panti Waluya Malang, and the UPT Herbal Materia Medica Batu Laboratory.

*Research Subject*

The sampling strategies used purposive, Samples of Gotu kola leaves (*Centella asiatica* (L.) were washed thoroughly with running water to remove adhering dirt, then chopped Gotu kola leaves were carried out, then air-dried in an area that was not exposed to direct sunlight. Then dry sorting was carried out and grinded using a blender to form a powder.

*Instruments*

Instruments used include knives, blenders, analytical scales, beaker glass, erlenmeyer, stir bar, test tube, measuring flask, measuring cup, pH meter, vial, pycnometer, cup, filter paper, maceration equipment, glass jar, rotary evaporator, shakers, water baths, thermometers, fume hoods. The materials used include Gotu kola, 70% ethanol, 96% ethanol, aqua rosae, glycerin, PVP (polyvinyl pyrrolidone), and aquadest.

*Making Centella asiatica Extract*

*Centella asiatica* extract was prepared using the maceration method, namely approximately 1000 grams of *Centella asiatica* herb powder was put in a glass jar, then 70% ethanol was added with a ratio of 1: 5, then covered and protected from sunlight. The maceration process was carried out for 3 days while stirring occasionally. Remaceration was carried out 2 times to maximize extraction. The resulting macerate is then concentrated using a rotary evaporator with the principle of evaporating the solvent to obtain an extract with a concentrated or viscous concentration according to the Ministry of Health of the Republic of Indonesia 2000. The entire extraction process is carried out at room temperature (Iswandana & Sihombing, 2017).

*Evaluation of Centella asiatica Extract*

The evaluation carried out on the gotu kola extract was in the form of testing the characteristics of the gotu kola extract including the identity of the extract, organoleptic tests (shape, color, taste, and smell), and calculation of the yield of the

extract. Organoleptic evaluation includes shape, color, and smell qualitative.

$$\% \text{ extract yield} = \frac{\text{extract weight}}{\text{simplicity weight}} \times 100\%$$

*Antioxidant Test*

The antioxidant activity test of the ethanol extract of *Centella asiatica* was carried out using the DPPH method. A standard curve was prepared by weighing 2 mg of DPPH powder and dissolved in 50 mL of ethanol p.a. Sample concentrations of ethanol extract of *Centella asiatica* herb were made with concentrations of 125, 250, 500, and 1000 ppm; then the absorbance was measured at  $\lambda_{\text{max}}$  508 nm. The absorbance measurement result data analyzed is the percentage of its antioxidant activity in the form of IC<sub>50</sub> value.

*Formulation of Face Mist Extract Gotu kola Extract*

This face mist is made in 3 formulas, with each formula containing different concentrations of gotu kola extract, namely 5%, 10%, and 15% (Apristasari et al., 2018; Melisa Widyani, Maria Ulfa, 2019). The formula used can be seen in table 1. The stages of the procedure carried out in making the face mist preparation were as first put *Centella asiatica* extract into the mortar, added 5% glycerin, 3% aqua rosae, and added 4% Polyvinyl Pyrrolidone) which had been dissolved in hot water, crushed until homogeneous then put in a container and added distilled water up to 100 mL.

Table 1. Face Mist Formulation of *Centella asiatica* Leaf Extract

Material	Formulas			Function
	5%	10%	15%	
<i>Centella asiatica</i> extract	5	10	15	Active substance
<i>Aqua rosae</i>	3	3	3	Refresher
Glycerin	5	5	5	Emollient
PVP	4	4	4	Addition
Aquadest	ad	ad	ad	Base
	100 ml	100 ml	100 ml	

Source: Face Mist with Natural Preservatives Formulation by Chem on Thailand (Thailand, 2021)

*Evaluation of Gotu Kola Extract Face Mist*

The physical evaluation carried out on the preparation of gotu kola extract face mist included physical quality tests: organoleptic testing, pH acidity testing, and density testing. Organoleptic testing, namely observing the shape, color, and smell of the face mist preparation of gotu kola extract (Apristasari et al., 2018). Testing the pH of face mist preparations with gotu kola extract was carried out with a calibrated pH meter instrument using standard buffer solutions pH 4, pH 7, and pH 10. Face mist preparations are said to be good, they must meet the skin pH criteria in the range of 4.5-6.5 (Apristasari et al., 2018). Testing the density of the face mist preparation of *Centella asiatica* extract was carried out by weighing the empty pycnometer without content (W<sub>1</sub>), the pycnometer containing aquadest (W<sub>2</sub>), and the pycnometer containing the face mist preparation sample (W<sub>3</sub>), then the results were recorded and followed by calculating the density using formula.

$$\text{Specific Weight} = \frac{(W_1 + W_2)}{(W_1 + W_3)}$$

*Ethical Consideration*

This research has obtained permission to conduct research from each of the parties concerned, and no formal ethical violations are required or carried out.

**RESULTS**

Face mist preparation made from ethanol extract of face mist gotu kola leaves (*Centella asiatica*) was made in three concentrations namely 5%, 10%, and 15%. In addition to testing the antioxidant activity, physical quality testing was also carried out, including organoleptic testing, pH acidity testing, and density testing. The yield of gotu kola leaf extract produced can be seen in table 2, the results of organoleptic testing can be seen in table 3, the results of testing for PH acidity can be seen in table 4, and the results of testing the antioxidant activity of DPPH can be seen in table 5.

Table 2. Yield of *Centella asiatica* Extract

Initial weight	Final Weight	Result
1000 g	180 g	18%

Source: Research Results Data, 2021

Table 3. Organoleptic Test Results for *Centella asiatica* Leaf Extract

Observation	Formulas		
	5%	10%	15%
Color	Brownish yellow	Brownish yellow	Brownish yellow
Form	Liquid solution	Liquid solution	Liquid solution
Sensation	Cold	Cold	Cold
Smell	Typical leaves	Typical leaves	Typical leaves

Source: Research Results Data, 2021

Table 4. Results of pH Acidity Test of *Centella asiatica* Leaf Extract

Formulas	pH
5%	5,18
10%	5,20
15%	5,28

Source: Research Results Data, 2021

Table 5. DPPH Antioxidant Activity Test Results

Sample Concentration (ppm)	Sample Absorbance	Inhibition	% Inhibition
1000	0,3134	0,5822	58,2217
500	0,3461	0,5386	53,8626
250	0,3802	0,4932	49,3168
125	0,4180	0,4428	44,2778

Source: DPPH Antioxidant Analysis Information Data, 2021

**DISCUSSION**

This study aims to make an optimal formulation for the face mist gotu kola (*Centella asiatica*) in concentrations of 5%, 10%, and 15%. The first step was to make *Centella asiatica* leaf extract into a face mist preparation and then tested for antioxidant activity and physical quality tests including: organoleptic testing, pH acidity testing, and density testing. The method used to extract *Centella asiatica* leaves is the maceration method. The resulting ethanol extract of gotu kola leaves has brownish-green color. The

weight of extracted dry simplicia was 1000 grams which were dissolved using 60% ethanol. The filtrate from the maceration and remaceration results was then evaporated to obtain a viscous extract of 180 grams with a yield calculation of 18% (results can be seen in table 2).

$$\begin{aligned} \% \text{ extract yield} &= \frac{\text{extract weight}}{\text{simplicity weight}} \times 100\% \\ &= \frac{180\text{g}}{1000\text{g}} \times 100\% \\ &= 18\% \end{aligned}$$

The thick extract of *Centella asiatica* leaves is made into a face mist. It is made in 3 formulas, with each formula containing different concentrations of the extract, namely concentrations of 5%, 10%, and 15%. The complete formula can be seen in table 1. Other ingredients used namely aqua rosae (as an agent that gives a cooling sensation), glycerin, PVP (polyvinill pyrrolidone), and aquadest (as a solvent), each of which is weighted according to the calculation of the formula. *Centella asiatica* extract was put into a mortar, added glycerin, and added PVP which had been dissolved in hot water, then aqua rosae, crushed until glycerin, and added PVP which had been dissolved in hot water, crushed until homogeneous then put in a spray bottle and added distilled water to 100 mL.

Face mist organoleptic testing was carried out by visually observing the color, shape, smell, and taste. The results can be seen in table 3. The odor produced from the preparation with a concentration of 5% is the distinctive odor of the leaves, while the 15% specific odor of the leaves produced is somewhat more concentrated because the levels of gotu kola leaf extract are higher than that of the 5% concentration. The face mist preparation uses the formula for adding the ingredient aqua rosae known as rose water, this ingredient gives a fresh sensation and has a distinct rose fragrance. The face mist dosage form is the same as in the form of a solution, while the color of the face mist at concentrations of 5%

and 10% is slightly brownish and the concentration of 15% is darker brown.

Testing the results of antioxidant activity using the DPPH method. The DPPH method is used because this method is the simplest, easiest, fastest, and quite a sensitive method and only requires a small number of samples so that it can be used extensively to test the ability of compounds to act as electron donors. The results of the antioxidant activity test of the ethanol extract of gotu kola leaves showed that this extract had a fairly low antioxidant activity. Based on the results of testing the antioxidant activity of DPPH in table 5. This is indicated by the obtained IC<sub>50</sub> value of 372.2449 ppm. In this study, the ethanol extract of *Centella asiatica* leaves made was said to be less active as an antioxidant, because its IC<sub>50</sub> value was more than 100 µg/ml or 100 ppm.

$$\begin{aligned} Y &= Ax + B \\ Y &= 0,0147x + 44,528 \\ R^2 &= 0,902 \\ IC_{50} &= \frac{(50 - B)}{A} = 372,2449 \text{ ppm} \end{aligned}$$

The pH acidity test was carried out after making the face mist using a pH meter, in each preparation a concentration of 5%; 10%; and 15% has a pH values in the same range, namely pH 5.18; 5.20; and 5.28. The pH range of 5 is the pH of preparations that are allowed for cosmetics used on the skin, especially on the face, as the skin pH in the Indonesian National Standard (SNI) is 4.5 – 7.5. In this study, testing the density of the preparation used a pycnometer which was weighed on an analytical balance. The results showed that the empty pycnometer weight was 20.6124 g (W<sub>1</sub>), the water pycnometer weight was 44.9774 g (W<sub>2</sub>), and the face mist pycnometer weight was 45.0235 g (W<sub>3</sub>). These data were entered into the density formula, after which it was calculated, it was found that the density of this face mist preparation was 0.999298.

## CONCLUSION

Based on the research results from the manufacture and physical quality test of face mist preparations made from ethanol extract of *Centella asiatica* leaves that have been carried out, it can be concluded that face mist of *Centella asiatica* leaves ethanol extract can be made into face mist preparations. The results of the physical quality test of the face mist preparation of the ethanol extract of *Centella asiatica* leaves met the skin pH requirements.

## SUGGESTIONS

Suggestions that can be given for this study are to test the viscosity or viscosity of the face mist preparation of ethanol extract of leaves.

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## AUTHOR CONTRIBUTION

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Methodology, Formal analysis, Investigation, Supervision, and Writing.

### Author 2:

Conceptualization, Funding Acquisition, Project Administration and Resources.

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