KnE Medicine

ICMEDH
The International Conference of Medicine and Health (ICMEDH)
Volume 2022

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Conference Paper

Characteristics and Stability of Candle Nut Oil (Aleurites Moluccana) Nanoemulsion Hair Tonic Preparation

Uswatun Chasanah*, Faldi Yudastama, Dyah Rahmasari

Pharmacy Department, Health Science Faculty, University of Muhammadiyah Malang, Indonesia

ORCID
Uswatun Chasanah: https://orcid.org/0000-0002-3508-6348

Abstract.
Candle nut (*Aleuritas molucana*) is a plant that can produce oil to stimulate hair growth because it contains oleic acid which is an antioxidant. One core of candle nut seeds can contain as much as 50-60% oil, which can be made into hair care cosmetics through the preparation of hair tonic nanoemulsion. This study aimed to determine the effect of different concentrations of candle nut oil (5%, 6%, and 7%) on the characteristics and stability of a candle nut oil nanoemulsion hair tonic preparation. Candle nut oil was formulated into hair tonic nanoemulsion preparations and then tested for characteristics and stability for cycling test preparations. It was found that there were differences in the characteristics and stability values of formulas I, II, and III. The variations in the concentration of the active ingredient of candle nut oil (5%, 6%, 7%) affected the characteristics of the hair tonic by affecting the droplet size, polydispersity index, zeta potential, pH and viscosity of the preparation. The stability test using the cycling showed that the stability of the hair tonic was affected through changes in the pH value and viscosity of the preparation.

Keywords: candle nut oil, characteristics and stability, hair tonic, nanoemulsion

Corresponding Author: Uswatun Chasanah; email: uswatun@umm.ac.id

Published 15 September 2022

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the ICMEDH Conference Committee.

1. Introduction

Hair for everyone is a beautiful and beautiful crown for both women and men. In addition, hair can affect the self-confidence of everyone because hair reflects a person's age, health, appearance, and even personality so that hair becomes one of the elements in each of them that cannot be ignored [1].

Abnormalities in hair can happen to anyone regardless of age, be it children or adults. One of the most common hair disorders is hair loss. Hair loss is a problem that cannot be ignored because continuous hair loss can cause baldness [2].

Hair cosmetic products can solve problems that occur in hair such as hair loss. The active ingredients in hair cosmetic products come from natural or chemical ingredients

that have the function of keeping hair healthy hair condition to keep it healthy. One of the hair cosmetic preparations that serves to treat hair loss is Hair Tonic [3].

Nanoemulsion is development of nanotechnology. Nanoemulsiondefinable as an oil in water emulsion (oil in water) with a particle diameter of about 500 – 1000 nm. The particles in the nanoemulsion can be in the form of oil in water (o/w) and water in oil (w/o) where water and oil are the core particles. The purpose of the manufacture of nanoemulsionsthat is to improve delivery effecttherapy on preparations (P, D Bhalodia and P, 2010). Candlenut (Aleuritas molucana L.) is one of the plants that can produce oil forstimulate hair growth because it contains acid oleic which has antioxidant properties so it can cause relaxation of blood vessels hair follicle area [4].

2. Research Methods

This research was carried out using an experimental method, namely to determine the proportion of the best active ingredients by comparing the effect of increasing levels of active ingredients in candlenut oil on the characteristics and stability of the hazelnut oil nanoemulsion hair tonic preparations with concentrations of 5%, 6%, and 7%.

Analysis of the data in this study for characteristic tests including viscosity and pH data using the One-Way Anova test, with Ha used there is a significant difference in characteristics between the three concentrations of hair tonic nanoemulsion preparations, while H0 used is there is no significant difference in the characteristics between the three concentrations of the hair tonic nanoemulsion of candlenut oil. Furthermore, for the analysis of the stability data of the preparation, the Sample Paired T-Test was used.

2.1. MATERIALS AND METHODS

2.1.1. Tool

The tools used are mettler-toledo analytical gram balance, watch glass, porcelain dish, beaker, measuring cup, pH MeterBasic 20 Crison, Rotational Viscometer Brookfield Dial-reading Viscometer, Fisher Scientific Hotplate, Thermo Scientific, Heidolph Digital Homogenizer, Stirring rod, and particle size analyzer.

2.1.2. Ingredients

Research materials used are candlenut oil (Lansida Group), Tween 80 (Subur Kimia Jaya), Spaan 80 (PT. ENVIRO PRIMA), 96% ethanol (PT. NISSICHEM INDOSPECIALTY), Aquades (purelizer Official Shop).

2.1.3. Preparation Method

Candlenut oil was mixed with 96% ethanol then covered with aluminum foil and heated at a temperature of 60°C then stirred using a magnetic stirrer at 350 rpm for 7 minutes, then tween 80 was mixed with span 80 in a porcelain dish and stirred using an ad homogeneous stirring rod. It is put in little by little and stirred with a magnetic stirrer at 700 rpm for 15 minutes, then the preparation is transferred to the tool homogenizer and stirred at 700 rpm. Then, aquadest is added little by little and stirred with a homogenizer for approximately 5-7 minutes.

Table 1: Preparation Formula.

Ingredients	Function	F1 (%)	F2 (%)	F3 (%)
Oil Candlenut	Active Ingredients	5	6	7
Tween 80	Surfactant	18.4	22.09	25,77
Span 80	Surfactant	1.8	2.15	2.51
Ethanol 96%	Kosurfktan	3.5	3.5	3.5
Aqua Rosae	Corrigen odorist	Qs	Qs	Qs
Distilled water	Solvent	Ad 100	Ad 100	Ad 100

2.1.4. Droplet Measurement

The droplet, PI, and zeta potential measurements of nanoemulsion preparations were measured by Particle size analyzer using dynamic light scanning method.

2.1.5. Organoleptic Observations

Organoleptic testing is done by observing visually on the shape, color, and odor of the preparation.

2.1.6. pH measurement

Measurement of the pH of Hair tonic nanoemulsion preparations using a digital pH meter. Before measuring the pH of the preparation, it is necessary to calibrate the pH meter with a buffer solution 4 and 7 to ensure that the pH meter used is not damaged or functioning properly. Viscosity Measurement

In testing the viscosity of the Hair tonic nanoemulsion preparation using a Brookfield Viscometer with spindle No. 61 at 60 rpm. Record the viscosity values at each speed. The viscosity value is obtained by reading the X factor contained in the Brookfield Viscometer Catalog.

2.1.7. Nanoemulsion Type Determination

Penoemulsion type determination test identified by the dilution method. 1 g of nanoemulsion hair tonic was dissolved in 100 ml of distilled water. If the nanoemulsion is insoluble, it is included in the water-in-oil nanoemulsion type.

2.1.8. Preparation Stability Test

Stability test of the preparation was carried out by cycling test by storing hair tonic preparations nanoemulsion at 4˚C for 24 hours and then transferred at 40oC for 24 hours (1 cycle). This process was carried out six times (6 cycles).

3. Result

Measurement of droplet size, polydispersity index, and zeta potential using the method *dynamiclight scanning*.

Nanoemulsions have very fine and small particle sizes, namely < 100 nm [5]. From these data, it shows that the hair tonic preparation of candlenut oil each formula is included in the preparation nanoemulsionoraccording with spesification.

Nanoemulsions that have a PI value of 0.01-0.7 indicate a uniform droplet size or monodispersion [6]. The results of the measurement of the average polydispersity index in each formula have a polydispersity index value of <0.7 which means that each formula in the Hair tonic nanoemulsion of candlenut oil has monodispersed particles.

storage have score potential > +30 mV or < -30 mV [7].Based on data the showthat each The dosage formula has a potential zeta value that does not meet the specification

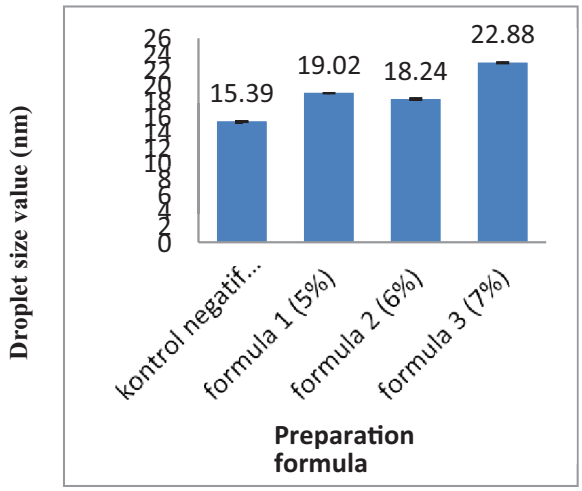

Figure 1: Droplet Size Histogram.

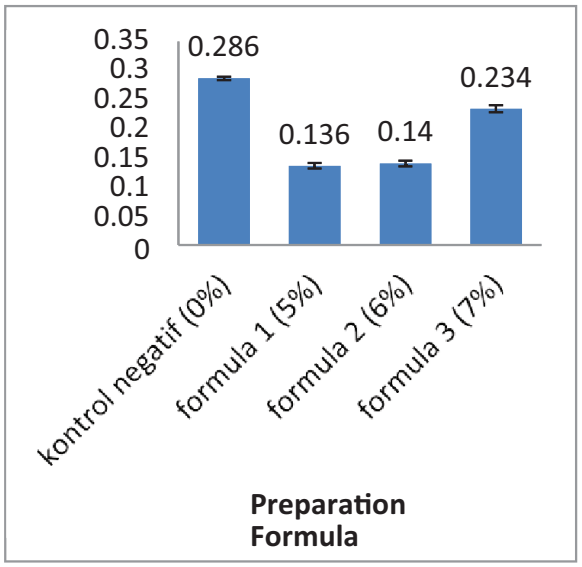

Figure 2: Polydispersity Index Histogram.

criteria. The zeta potential value can be influencedbyactive ingredientsand combination surfactant used. Candlenut oil and the combination of tween 80 and span 80 (non-ionic surfactants) are materials that have no charge, so that the preparationnanoemulsionol candlenut generatechargevalu zeta close to zero because it has no ionic bonds [8] organoleptic testing of the candlenut oil nanoemulsion was carried out visually.

If it is adjusted to the specifications of the liquid form and clear or clear color, then the four formulas are included in the desired specifications

The range of pH values for a good hair tonic preparation is 3.0-7.0 so it cannot irritate the skin [2]. From the results of these data shows that each formula enters the specification range and there are differences in the data in each formula

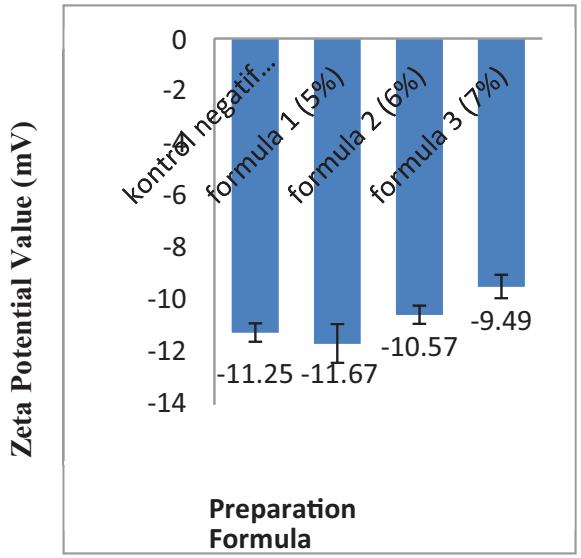

Figure 3: Zeta Potential Histogram Stable colloid at time.

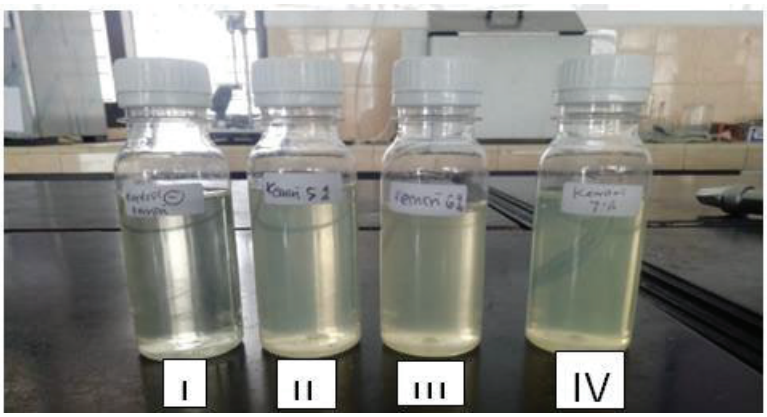

Figure 4: Preparation *Hairtonic* hazelnut oil nanoemulsion.

Table 2: Observation result Test Organoleptic.

preparation	Form	Smell	Color
Negative Control	Fluid	Typical	Clear
Formula 1	Fluid	Pecan special	Clear yellow
Formula 2	Fluid	Pecan special	clear yellow
Formula 3	Fluid	Typical candlen	Yellow clear

From the observation of the type of nanoemulsion preparations Hair Tonic nanoemulsion candlenut oil showed that the negative control formulas, I, II, and III visually have the same appearance and shape,which is completely dissolved with aquadest. If the nanoemulsion completely dissolved with aquadest, the nanoemulsion preparation is included in the type of oil in water and vice versa [2].

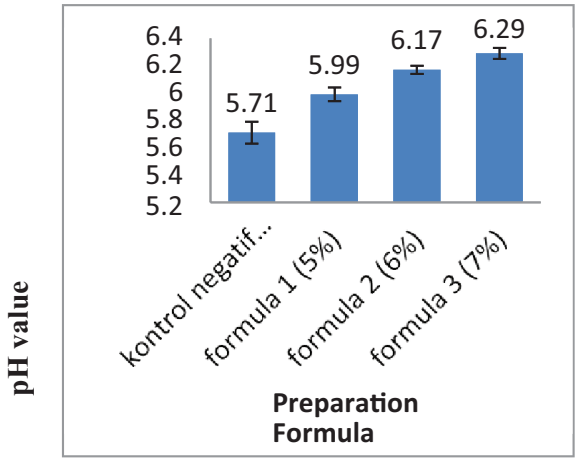

Figure 5: Histogram Check pH.

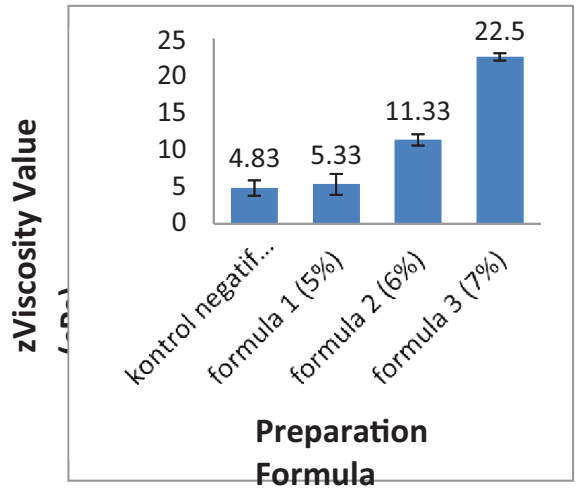

Figure 6

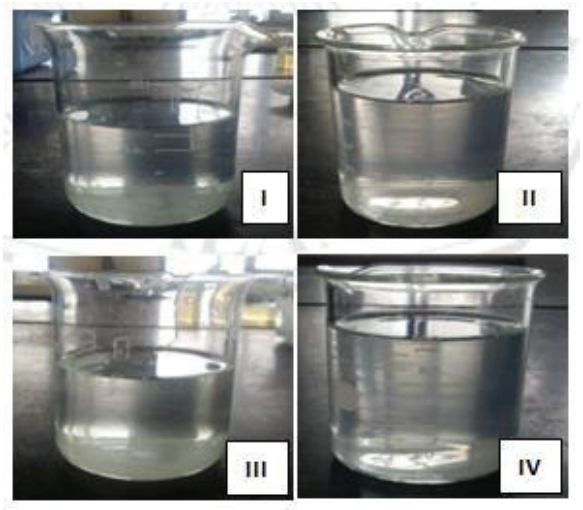

Figure 7: Observation results of nanoemulsion type determination test.

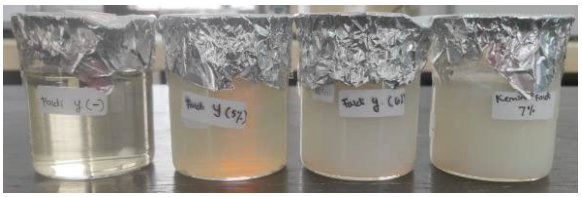

Figure 8: Results of organoleptic observations after Cycling test.

The results of the organoleptic evaluation after the Cycling test showed that each formulation of Hair tonic nanoemulsion candlenut oil was unstable in the storage process, this was indicated by changes in the organoleptic properties of each formula after 6 storage cycles.

The results of the observation of the phase separation test from the Hair tonic nanoemulsion of candlenut oil showed that the negative control formulas I, II, and III did not experience phase separation.

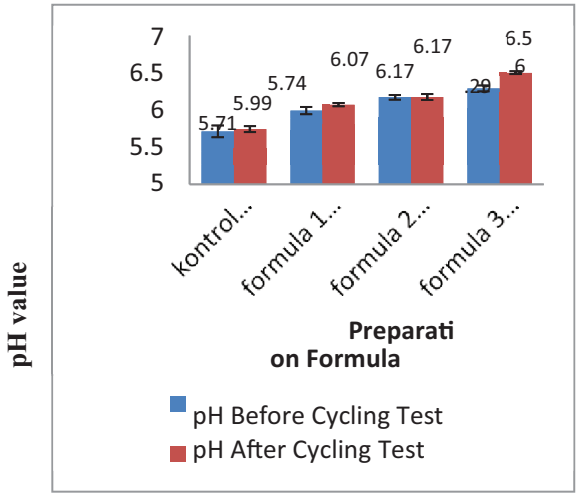

Figure 9: Histogram pH test results before and after the Cycling test.

Based on the data table V.13 shows that there is an increase in the pH value after the Cycling test is carried out. To determine whether or not there is an effect of the Cycling test on the pH value of each formula, the Paired-Sample T Test is carried out. From the analysis of the Paired-Sample T Test, the results obtained are the p value (0.018) < 0.05. This shows that the Cycling test has a significant effect on the pH value of the preparation.

4. Discussion

The viscosity range for nanoemulsion preparations is 1-100 cPs [9] From the results of these data shows that each formula enters the specification range and there are

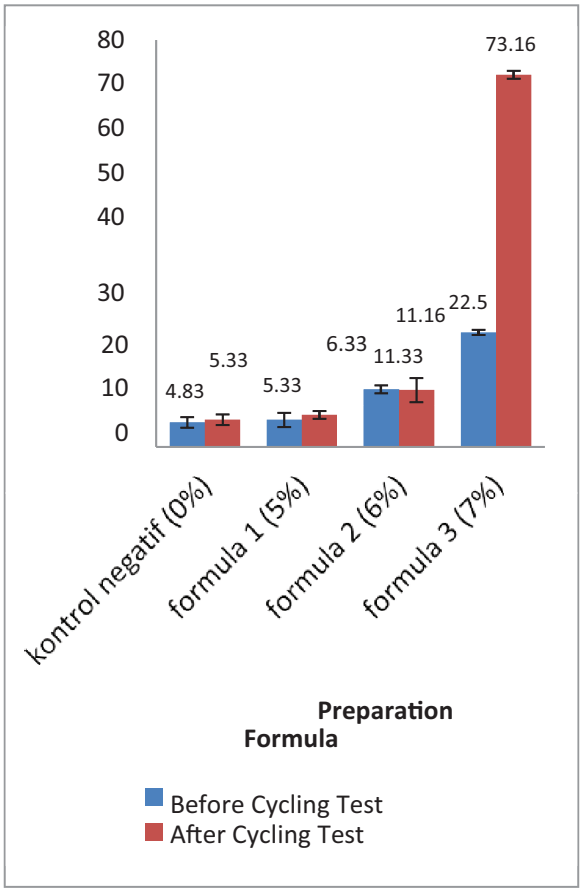

Figure 10: Histogram Result Viscosity check before and after the Cycling test.

differences in the data in each formula. The surfactant concentration in each formula adjusts to the active ingredient content of Candlenut oil in order to obtan clear and The table data shows that there is an increase and decrease in the value of viscosity after the Cycling test is carried out. To determine whether or not there is an effect of the Cycling test on the viscosity value of each formula, the Wilcoxon test was carried out. The Wilcoxon non parametric statistical analysis test was carried out because the viscosity data obtained during the normality test obtained abnormal values. From the Wilcoxon analysis, the results obtained are the p value (0.044) < 0.05. This shows that Cycling test gave a significant effect on the viscosity value of each preparation.

5. Conclusion

Based on the results of the study, it can be concluded that:

1. The concentration of candlenut oil 5%, 6%, and 7% affects the characteristics of the Hair tonic nanoemulsion of candlenut oil (Aleuritas moluccana L.) which can

increase the value of droplet size, Polydispersity Index, Zeta Potential, pH and can increase the viscosity of the preparation.

2. The concentration of candlenut oil 5%, 6%, and 7% affected the stability of the Hair tonic nanoemulsion of candlenut oil (Aleuritas moluccana L.) which was able to increase the pH and viscosity values after the Cycling test was carried out.

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