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Research Article

Formulation and Evaluation of Candlenut (*Aleurites moluccana* L.) Oil in Gel Preparation

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ABSTRACT

Objectives: The purpose of this study was to formulate a gel preparation from the candlenut (*Aleurites moluccana*) oil. The resulting formula was evaluated by test of organoleptic, homogeneity, surface dispersion, pH value, and gel stability during storage.

Design: This research was conducted by making a gel preparation containing candlenut oil as the active ingredient with various concentrations. The basic ingredients used were carbopol, hydrogenated castor oil (HCO), propylene glycol, methyl paraben, propyl paraben and distilled water. Evaluation of formula and stability was carried out in storage for 12 weeks. Formula tests were carried out to assess the physical form of the preparation, the resulting pH, and the stability during storage.

Interventions: The formulas were varied in three different concentrations of active substances, namely 15%, 20% and 25% candlenut oil. Evaluation of formula was compared with negative control, gel base without active substances.

Main outcome measurement: The results show that the resulting gel has a consistency similar to general gel (semisolid), white in color and has the smell of candle oil. The whole gel has good homogeneity. The pH value of each formula is around 6.0-6.4. The surface dispersibility diameter is 5.3-5.7 cm. The whole formula is stable in storage for 12 weeks.

Conclusion: Candlenut oil can be formulated in gel form and has good characteristics and stability.

Keywords: *Aleurites moluccana*, formula evaluation, gel formulation

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INTRODUCTION

Candlenut (*Aleurites moluccana* L.) is an important multipurpose plant in Indonesia. The candlenut plant has been used for various purposes both as a base for cooking spices and for pharmaceuticals. In Indonesia candlenut is spread to various provinces and can grow well. The ease with which candlenut grows in various places makes candlenut production increase from year to year so that candlenut becomes a domestic and export commodity in Indonesia¹. Candlenut oil contained in seeds has many benefit, including ingredients for paints, varnishes, soaps, medicines, cosmetics, and fuel^{2,3}.

The oil content in candlenut seeds is classified as high, namely 55 - 66% of the weight of the seeds. This makes candlenut oil an economic commodity to be processed into cosmetics and medicinal ingredients^{4,5}. The candlenut oil is likely used for hair and skin care. The form of formulas found in the market is still limited which still in original form of oil, but there is no more complex development in products such as cream, paste or gel^{1,6}. In this article, we will discuss the preparation of a gel formula made from candlenut oil and its evaluation in the form of organoleptic tests, homogeneity, surface dispersion, pH value, and stability during storage.

MATERIALS AND METHODS

Materials and Tools

The materials used were candlenut oil, carbopol, methylparaben, propylparaben, propylene glycol, Hydrogenated castor oil and distilled water. The tools used

were analytical scales, glass ware, pH meters, and dispersion tools.

Gel Formula

The gel formula can be seen in Table 1.

Table: 1. The formula of candlenut oil gel

| Materials | Concentration (%) | | | |
|-------------------------------|-------------------|-------|-------|-------|
| | F0 | F1 | F2 | F3 |
| Candlenut Oil | 0 | 15% | 20% | 25% |
| Carbopol | 3% | 3% | 3% | 3% |
| Hydrogenated Castor Oil (HCO) | 15 % | 15% | 15% | 15% |
| PropyleneGlycol | 5% | 5% | 5% | 5% |
| MethylParaben | 0,15% | 0,15% | 0,15% | 0,15% |
| PropylParaben | 0,05% | 0,05% | 0,05% | 0,05% |
| Distilled Water(into) | 60 ml | 60 ml | 60 ml | 60 ml |

F = Formula

The gel was made by weighing the carbopol, putting it into a mortar filled with hot distilled water, let it expand in a few minutes, and grinding it into a gel mass. Propylene glycol, methyl paraben and propyl paraben were added sequentially and mix until homogeneous (mass no 1). Candlenut oil was mixed with Hydrogenated Castor oil (HCO) then added into the first mass and mix it into homogeneous gel mass^{7,8}.

Evaluation of Gel Formula

The evaluation of the formula includes the organoleptic test, homogeneity, dispersion test on the surface, pH value, and stability in storage for 12 weeks. Organoleptic test is intended to see the physical appearance of the preparation which includes form, color and odor^{9,10}. The homogeneity test is carried out by using flat transparent glass: when a certain number of preparations applied to a piece of glass or other suitable transparent material, the preparation must show a homogeneous arrangement and do not show any coarse grains^{11,12}.

Weigh the gel as much as 0.5 grams then place it on the middle of a petri dish. Put another petri dish on top of the

gel and let it remain for a minute. Add 50 gram and 100 gram load then measure the dispersion diameter^{9,13}.

Measurement of pH values is carried out using a pH meter. Firstly, the tool was calibrated by using an acidic buffer and aqueous buffer then the electrodes were rinsed with distilled water and wipe it with tissue. Weigh 1 g of the preparation and dissolve it in 100 ml distilled water. Then the electrodes are immersed in the solution. Let the pH meter show a constant pH value^{14,15}.

Stability test was carried out by looking at the changes in parameters above within storage for 12 weeks. Each formula was examined at the 3rd week, 6th week, 9th week and 12th week

RESULT AND DISCUSSION

Evaluation of candlenut (*Aleurites moluccana* L.) seed oil gel included organoleptic test, homogeneity, dispersibility test, and pH value for 12 weeks. The test sample consisted of 4 formulas, namely F0 (control), F1 (15%), F2 (20%), and F3 (25%). The results of the evaluation can be seen in tables 2, 3, 4, and 5 below:

Table: 2 The Result of Gel Organoleptic Test

| Formula | Organoleptic Test Results | | |
|---------|---------------------------|-------------|---------------------------------|
| | Form | Color | Odor |
| F0 | Gel | Transparent | Odorless |
| F1 | Gel | White | Peculiar Smell of Candlenut Oil |
| F2 | Gel | White | Peculiar Smell of Candlenut Oil |
| F3 | Gel | White | Peculiar Smell of Candlenut Oil |

Table: 3. The Result of Homogeneity Test

| Formula | Homogeneity | | | |
|---------|----------------------|----------------------|----------------------|-----------------------|
| | 3 rd week | 6 th week | 9 th week | 12 th week |
| F0 | Homogeneous | Homogeneous | Homogeneous | Homogeneous |
| F1 | Homogeneous | Homogeneous | Homogeneous | Homogeneous |
| F2 | Homogeneous | Homogeneous | Homogeneous | Homogeneous |
| F3 | Homogeneous | Homogeneous | Homogeneous | Homogeneous |

Table: 4 The Result of Dispersibility Test

| Formula | Diameter + SEM (cm) |
|---------|---------------------|
| F0 | 5.7+0.02 |
| F1 | 5.5+0.34 |
| F3 | 5.5+0.23 |
| F4 | 5.3+0.23 |

Table: 5 The Result of pH Measurement

| Formula | pH Value + SEM | | | |
|---------|----------------------|----------------------|----------------------|-----------------------|
| | 3 rd Week | 6 th Week | 9 th week | 12 th week |
| F0 | 6.4+0.00 | 6.4+0.00 | 6.3+0.00 | 6.3+0.00 |
| F1 | 6.3+0.00 | 6.3+0.00 | 6.3+0.00 | 6.2+0.00 |
| F2 | 6.3+0.00 | 6.2+0.00 | 6.2+0.00 | 6.2+0.00 |
| F3 | 6.1+0.00 | 6.1+0.00 | 6.0+0.00 | 6.0+0.00 |

Table: 6 The Result of Stability Test

| Formula | 3 rd week | | | 6 th week | | | 9 th week | | | 12 th week | | |
|---------|----------------------|---|---|----------------------|---|---|----------------------|---|---|-----------------------|---|---|
| | x | y | z | x | y | z | x | y | z | x | y | z |
| F0 | - | - | - | - | - | - | - | - | - | - | - | - |
| F1 | - | - | - | - | - | - | - | - | - | - | - | - |
| F2 | - | - | - | - | - | - | - | - | - | - | - | - |
| F3 | - | - | - | - | - | - | - | - | - | - | - | - |

Explanation: x (change in form), y (change in color), z (change in odor)

Organoleptic test includes testing the form, color and odor. The resulting gel has a semi-solid form which is characteristic of the gel itself. This can be seen from the change in color from the gel base which was originally clear. The higher concentration, the whiter the color will be. The higher the concentration, the aroma of candlenut oil will be even thicker. For the base gel itself, is odorless⁹.

The pH test was carried out on each gel preparation formula. Based on the results of the analysis, there was no significant changes in any formulas during 12 weeks of storage. This pH value indicates that the preparation is stable during storage^{10,16}.

Dispersibility test is carried out to ensure an even distribution of the gel when applied to the skin. The gel was weighed as much as 0.5 grams and then placed in the middle of a round glass scale. On top of the gel another round glass or other transparent material is placed and a ballast so that the weight of the round glass and a weight of 150 grams is left to stand for 1 minute, then the diameter of the distribution is recorded. The dispersibility value of the gel is considered good if it has a value between 5-7 cm^{9,10,13}.

Based on the results of the stability test, there was no changes in the gel formula during 12 weeks of storage. There was no changes in form, color and odor of the candlenut oil gel. This results show formulated candlenut oil gel has a good stability during storage.

CONCLUSION

Candlenut (*Aleurites moluccana*) oil which has been formulated in a gel dosage form has good characteristics and is stable in storage for 12 weeks at room temperature.

CONFLICT OF INTEREST

All author have nothing to declare.

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