The Formulation and Physical Evaluation of Emulgel the Kalakai (Stenochlaena Palustris Bedd) Roots Ethanol Extract As a Sunscreen

Risqika Yuliatantri Paramawidhita*, Rabiatul Adawiyah, and Agustinawati Umaternate

Dosen Program Studi D3 Farmasi, Fakultas Ilmu Kesehatan, Universitas Muhammadiyah Palangkaraya

*risqikayuliatantriparamawidhit@gmail.com

Abstract. Kalakai (Stenochlaena palustris) is one of the diversity of Kalimantan typical plants that are often consumed as food but can also be used as medicinal plants. Ethanol Extract of Kalakai Root has been shown to have very strong antioxidants and has an SPF value of extreme ability level. Researchers want to examine a form of cosmetic emulgel which potentially as sunscreen. The purpose of this study is as a preliminary stage to see how the physical evaluation results (organoleptic, pH and dispersal power) of emulgel kalakai roots ethanol extract at 1% and 2% concentration. The results obtained for formula I (1%) and formula II (2%) of emulgel kalakai roots ethanol extract meet the organoleptic test quality parameters, pH and spreadability test.

1. Introduction

Kalimantan has typical plants that are widely used as medicinal plants, one of them is kalakai sometimes called spikes Haruan (Stenochlaena palustris bedd) or ferns. Kalakai (Stenochlaena palustris) is a plant that thrives on peat soils and also grow well in sandy soils. One part of the kalakai plant used in this study is the kalakai root. The results stated that the ethanol extract antioxidant activity of the kalakai root were tested using parameters Inhibitory Concentration 50 (IC50) with DPPH (using 2,2- diphenyl-1- pikrihidrazil) method had very strong antioxidant activity resulting in an IC50 value of 19.06 PPM [1]. As for the SPF value of the kalakai root ethanol extract is at a concentration of 300 ppm, and 350 ppm obtained SPF values in a row of 11, and 14 were in the range of 11 thus it hasan extreme level of ability which means it has extreme protection or more [2].

Based on the antioxidant parameters and the SPF value of the research that has been done, the researchers want to examine the reserve of cosmetic forms. Due to the booming natural cosmetics on the market today, however, from Kalimantan typical plants such as the kalakai plant have not been found. The exposure of UV light is oxidative because it can produce a free radical compound called reactive oxygen species (ROS) [3]. One of the most common attempts is to use sunscreens reserve. The addition of antioxidant compounds into sunscreen reserves is known to be more provide skin protective effect.

In this study the semisolid reserve selected is emulgel. Emulgel reserves are also called emulsion reserves where the viscosity of the water phase is increased through the addition of a gelling agent. The advantages of this emulgel reserve are comfortable to use and able to cling for a long time on skin so
that it can support its use as a sunscreen reserve [4]. So in this study the emulgel reserves formulated containing ethanol extract of the kalakai roots concentration of 1% and 2%. This research is the first stage by conducting physical evaluation of reserves, determining of organoleptic evaluation, determining of pH and dispersal power.

Figure 1. Kalakai Plant (*Stenochlaena palustris*)

2. **Research Methods**

2.1 **Extraction**
The collected and dried of kalakai roots (up to a water content <14%), then mashed to a coarse powder. The Kalakai root powder weighed 100 g then extracted using 70% ethanol solvent at a ratio of 1:10 for 3x24 by replacing the solvent every 24 hours. Then the liquid extract separated from residue using whatman filter paper No. 1. It remacerated until the solvent becomes colorless. The liquid extract was concentrated using a rotary evaporator at 60°C, for about 8 hours, then it evaporated on a waterbath at 60°C to form a viscous extract [5].

2.2 **The Production of Emulgel**
The process of making emulgel with active ingredient of kalakai root extract is started from mixing all the oil phases that is span 80 mixed with paraffin liq then melted at 70°C. Then the water phase, that is Tween 80, which has been dissolved using hot aquadest. Afterwards, the air phase is put into the oil phase at 70°C while continuing to stir until an emulsion is formed. The gelling phase, which is HPMC, is dissolved using hot water in a mortar and is stirred until a gel base is formed. Methyl paraben and propyl paraben is dissolved in propylene glycol, then mixed with a gel base. After that, the emulsion formed is put into a mortar and stirred constantly until a good emulgel is formed.

2.3 **Physical evaluation of reserves**

2.3.1 **Organoleptic Test**
The organoleptic examination carried out include color, odor and texture. The texture observed is the reserve consistency [6].

2.3.2 **pH test**
The pH meter is calibrated using a solvent solution of pH 7 and pH 4. The pH meter electrode is dipped into the sample examined, the pH meter needle is allowed moving to a fixed position. The pH indicated by the pH meter needle is recorded [7].

2.3.3 **Dispersal Test**
A total of 0.5 grams of cream reserves are placed carefully on graph paper coated with glass, left for a moment (1 minute). The area given by the reserves is calculated. Then it covered again with a glass by a certain burden for each 50 grams, 100 grams and 150 grams. It left for 60 seconds, then the expanding area given by the reserve can be recorded [8].
3. Results and Discussion

Figure 2. Emulgel Reserve of Kalakai Root Ethanol Extracts

3.1 Organoleptic
Organoleptic observations including texture, color and odor of the ethanol emulgel extract of the Kalakai Root are shown in Table 1.

| Sample         | Color | sense of smell | consistency | Texture           |
|----------------|-------|----------------|-------------|-------------------|
| Formulation 1% | brown | odorless       | Thick       | Soft, smooth      |
| Formulation 2% | brown | odorless       | Thick       | Soft, smooth      |

3.2 PH measurement

| Replication | Formulation I (1%) | 2 | 3 | Average |
|-------------|-------------------|---|---|--------|
| I (1%)      | 6.2               | 6 | 6 | 6.1    |
| II (2%)     | 5.9               | 6.4| 6 | 6.1    |

Through the result of pH observation, the average was pH 6.1 for each emulgel formula of kalakai root ethanol extract 1% and 2%. A good pH value is 4.5-6.5 or in accordance with the pH value of human skin [9].
3.3 Dispersal Power of Reserve

Table 3. Results of the Dispersal Power of Emulgel Reserve of Kalakai Root Ethanol Extracts

| Formulation | Replication | Beginning | 50g | 100g | 150g |
|-------------|-------------|-----------|-----|------|------|
| Formula I   | 1           | 5,16      | 5,5 | 5,72 | 5,94 |
|             | 2           | 6,3       | 6,89| 7,08 | 7,38 |
|             | 3           | 6,61      | 7,19| 7,7  | 7,99 |
| Average ± standard deviation |            | 7,10 ± 1,05 cm |
| Formula II  | 1           | 6,04      | 6,25| 6,83 | 7,16 |
|             | 2           | 4,94      | 5,5 | 5,92 | 6,11 |
|             | 3           | 6,24      | 6,76| 7,05 | 7,31 |
| Average ± standard deviation |            | 6,86 ± 0,65 cm |

Based on the results of the dispersal power of emulgel reserve of kalakai root ethanol extracts, it was found that the average formula of 1% is 7.10 cm and the average formula of 2% is 6.86 cm. The diameter of a good dispersal power is between 5-7 cm [9].

4. Conclusion

From the results of this study, it can be concluded that all emulgel reserve of kalakai root Ethanol extract with a concentration of 1% and 2% meet the quality parameters of organoleptic test, pH test and dispersal test.
References

[1] Adawiyah, R. dan Rizki. M. I. 2018. Aktivitas Antioksidan Ekstrak Etanol Akar Kalakai (Stenochlaena palustris Bedd) Asal Kalimantan Tengah. Jurnal Pharmascience : Volume 05. Nomor 01.

[2] Adawiyah, R. 2019. Penentuan nilai sun protection factor secara in vitro pada ekstrak etanol akar kalakai (stenochlaena palustris bedd) dengan metode spektrofotometer uv-vis. Jurnal Surya Medika : Volume 4. No. 2.

[3] Ho, R., T. Teai, J.-P. Bianchini, R. Lafont, and P. Raharivelomanana. 2010. Ferns: From traditional uses to pharmaceutical development, chemical identification of active principles. p. 321-346. In H. Fernández, M.A. Revilla, and A. Kumar (ed.). Working with ferns: Issues and applications. Springer, New York.

[4] Paramawidhita, R.Y., Chasanah, U., Ermawati, D. 2019. Formulasi Dan Evaluasi Fisik Sediaan Emulgel Tabir Surya Ekstrak Kulit Batang Kayu Manis (Cinnamomum burmannii). Jurnal Surya Medika. Volume 05 No. 1.

[5] Jamshidi, M., E. Shabani, Z. Hashemi, dan M.A. Ebrahimzadeh. 2014. Evaluation of Three Method for The Extraction of Antioxidant from Leaf and Aerial Parts of Lythrun salicaria L. (Lythraceae). International Food Research Journal. 2: 783-788.

[6] Semwal, A., R. Kumar., dan R. Singh. 2013. Nature’s Aphrodisiacs - A Review of Current Scientific Literature. International Journal of Recent Advances in Pharmaceutical Research. 3(2): 1-20.

[7] Grag, A. et al., 2002 Spreanding of Semisolid Formu lation: An Update, Pharmaceutical Technology: 84-102.

[8] Chai,Tsun-Thai., Panirchellvum,E., Ong, Hean-Chooi and Wong, Fai-Chu. 2012. Phenolic contents and antioxidant properties of Stenochlaena palustris, an edible medicinal fern, Botanical Studies.

[9] Tranggono, RI, Latifah F, 2007. Buku Pegagan Ilmu Kosmetika, Jakarta, PT Gramedia.