

CHAPTER I

INTRODUCTION

1.1 Background

Indonesia is a country located in the tropics that has a high intensity of sunlight¹. The sun is one of the sources of energy that is beneficial for human life but can also have several harmful effects on the body, this occurs based on how often and how long the sun is exposed to the body². Excessive exposure to ultraviolet rays can cause various health risks such as redness effects on the skin and the possibility of developing skin cancer³. In Indonesia, skin cancer is the third most common cancer position after cervical and breast cancer⁴. One solution to prevent skin cancer recommended by the WHO is the use of sunscreen⁵.

Sunscreen is a preparation that contains chemical compounds that can absorb, scatter, or reflect UV rays that hit the skin⁶. Sunscreens can be divided into two types, namely synthetic and natural sunscreens. Natural sunscreen is widely chosen by the public because it is considered safer and more affordable⁷. Currently, there are many sunscreens circulating that utilize plants that have antioxidant activity⁸. Antioxidant compounds are substances that can neutralize free radicals

¹ Ihdina, A. and et al., 2016. *Sunscreen Activity of N Hexane Fraction of Libo Fruit Based on SPF Value*. Samarinda: Faculty of Pharmacy: Mulawarman University.

² Pavelkova, R. et al., 2020. Preparation and characterisation of organic UV filters based on combined PHB/liposomes with natural phenolic compounds. *Journal Biotechnol*, p. 7.

³ Arnanda, Q. and Nuwarda, R., 2019. The Use of Radiopharmaceuticals Technicalium-99M from Glutathione Compounds and Flavonoid Compounds as Early Detection of Free Radicals Triggering Cancer. *Journal of Pharmaceutical Supplements 17(2) : 2*, pp. 36-43.

⁴ Dampati, P. S. and Veronica, E., 2020. Potential of Black Onion Extract The Potential of Black Onion Extract as a Sunscreen against Ultraviolet Exposure. *Keluwih : Journal of Health and Medicine 2(1)*, p. 23–31.

⁵ Hanriko, R. and Hayati, J., 2019. Non-Melanoma Skin Cancer (NMSC) in Outdoor Workers and Their Interventions. *Health and Agromedicine 6(2)*, p. 405–409.

⁶ Minerva, P., 2019. The Use of Sunscreen for Skin Health. *Journal of Education and Family. 11. (1)*, pp. 95-101.

⁷ Oktaviasari, L. and Zulkarnain, A. K., 2017. Formulation and Physical Stability Test of Potato Starch O/W Lotion Preparation (Solanum tuberosum L.) As well as his activities as a sunscreen. *Pharmaceutical Magazine. Vol: 13*.

⁸ Amini, A., Hamdin, C. D., Subaidah, W. A. and Muliastari, H., 2020. Effectiveness of Sunscreen Cream Formula Based on Active Ethanol Extract of Wali Seeds (*Brucea javanica* L. Merr) Effectivity of Sunscreen Cream Formulation Containing Ethanolic Extract of Wali Secondary metabolites in the form of a group as compounds that play a major role. *Indo Pharmaceutical Journal 10 (1)*, pp. 50-58.

by donating electrons for free radicals so that the free electrons pair up and damage in the body can be stopped⁹.

Allah SWT has provided nature and its contents with various types of plants and their benefits. as Allah says in the Qur'an, surah At-thaha: 53.

الَّذِي جَعَلَ لَكُمُ الْأَرْضَ مَهْدًا وَسَلَكَ لَكُمْ فِيهَا سُبُلًا وَأَنْزَلَ مِنَ السَّمَاءِ مَاءً
فَأَخْرَجْنَا بِهَآزْوَاجًا مِّنْ نَّبَاتٍ شَتَّى ﴿٥٣﴾

It means: "He who has made for you the earth an expanse and who has made for you the earth a walk, and rainwater descends from the sky. So We grow with rainwater various types of plants".

Surah At-thaha verse 53 explains one of the ways Allah helps humans achieve their goals, which is by sending rainwater from the sky. God explains every event. This view reflects a belief in man's existential purpose, which is to enjoy the life given by God and use reason to achieve a higher meaning of life¹⁰.

One of the natural ingredients that has the potential to be a natural sunscreen is green grasshopper leaves. Green grasshopper leaves (*Cyclea barbata*. Miers) have secondary metabolite compounds in the form of flavonoids, alkaloids, and tannins¹¹. One form of sunscreen preparation is in the form of a gel. Gels are semisolid preparations that consist of suspensions made from small or large inorganic particles that are penetrated by a liquid. In this study, gel preparations were chosen because they dry easily, form a layer that is easy to wash, and provide a cooling sensation to the skin¹². Based on the description above, it is necessary to research the potential of green grasshopper leaves (*Cyclea barbata*. Miers) which can be used as sunscreen.

⁹ Arnanda, Q. and Nuwarda, R., 2019. The Use of Radiopharmaceuticals Technetium-99m from Glutathione Compounds and Flavonoid Compounds as Early Detection of Free Radicals Triggering Cancer. *Journal of Pharmaceutical Supplements* 17(2) : 2, pp. 36-43.

¹⁰ Ali, G. B., 2018. Analysis of Tafsir Al-Misbah by Quroish Shihab. *Journal of Chemical Information and Modelling* 53, 9, pp. 1689-1699.

¹¹ Najihudin, A., Rahmat, D. and Anwar, S. E. R., 2019. Formulation of Instant Granules From Ethanol Extract of Tangohai (*Kleinhovia hospita* L.) Leaves as an antioxidant. *Scientific Journal of Pharmacology Bahari*, 10(1), pp. 91-112.

¹² Andi, N. I. A., Ishak, P. and Abasa, S., 2022. Formulation and Activity Test of Kersen Leaf Ethanol Extract (*Muntingia calabura*) as a Sunscreen in Gel Preparations Based on Sun Protection Factor (SPF) Value. *PAPS Journals Vol. 1, No. 2*, p. 76.

1.2 Problem Formulation

1. What are the results of the evaluation of the physical quality of sunscreen gel preparations for green grasshopper leaf extract (*Cyclea barbata*. Miers) that is by SNI standards?
2. How does the variation in extract concentration affect the SPF value of the sunscreen gel preparation of green grasshopper leaf extract (*Cyclea barbata*. Miers)?

1.3 Research Objectives

1. To find out the results of the evaluation of the physical quality of sunscreen gel preparations extracted from green grasshopper leaves (*Cyclea barbata*. Miers) which is under SNI standards.
2. To determine the effect of variations in extract concentration on the SPF value of sunscreen gel preparations of green grasshopper leaf extract (*Cyclea barbata*. Miers).

1.4 Research Benefits

This research was carried out to obtain the following benefits:

1. Theoretical Benefits:

The results of this study can add to the science and be used as reference material for further research literature, especially regarding gel preparations from green grasshopper leaf extract (*Cyclea barbata*. Miers) as an effective sunscreen in protecting the skin from exposure to UV rays.

2. Practical Benefits:

The results of this study are expected to provide information to other researchers and the cosmetics industry about green grasshopper leaves that can be formulated into sunscreen gel preparations that effectively protect the skin from UV exposure.

1.5 Originality of Research

Research on sunscreen gel preparations has been carried out by several researchers as seen in Table 1 below.

Table 1. Originality of Research

Research Title	Type of Research	Variable	Result	Research Differences
Physical quality of green grasshopper leaf extract cream preparation (<i>Cyclea Barbata</i> . Miers) ¹³	Descriptive	Independent: green grasshopper leaf extract (<i>Cyclea Barbata</i> . Miers) Dependent: evaluation of the physical quality of the preparation of green grasshopper leaf extract cream (<i>Cyclea Barbata</i> . Miers)	Green grasshopper leaf extract cream preparations have a physical quality that follows the physical quality standards of cream preparations.	Independent: green grasshopper leaf extract concentration Dependent: quality evaluation and determination of SPF value of sunscreen gel preparations
Formulation and Activity Test of Kersen Leaf Ethanol Extract (<i>Muntingia calabura</i>) as Sunscreen in Gel Preparations Based on Sun Protection Factor (SPF) Value ¹⁴	Experimental	Independent: Kersen leaf extract concentration Dependent: Evaluation of the physical quality of the preparation and determination of the SPF value	Kersen leaf ethanol extract can be made in the form of a gel preparation because the sunscreen gel meets good gel standards physically and chemically, namely in terms of organoleptic, homogeneity, viscosity, dispersibility, adhesion, and pH. The most effective SPF value as a sunscreen is the 4th formula which is 14 (maximum protection) with 140 minutes of protection. The increase in the concentration of ethanol extract of kersen leaves in sunscreen gel causes the SPF value to increase.	Independent: green grasshopper leaf extract concentration Dependent: Evaluation of the quality of the preparation and determination of the SPF value of the sunscreen gel preparation

¹³ Pravita, A. and Fandi, S., 2019. *Physical Quality of Green Grasshopper Leaf Extract Cream Preparation (Cyclea barbata. Miers)*. Malang: Akademi Pharmacy Putra Indonesia Malang.

¹⁴ Andi, N. I. A., Ishak, P. and Abasa, S., 2022. Formulation and Activity Test of Kersen Leaf Ethanol Extract (*Muntingia calabura*) as a Sunscreen in Gel Preparations Based on Sun Protection Factor (SPF) Value. *PAPS Journals Vol. 1, No. 2*, p. 76.