

STUDY LITERATION OF CHEMICAL CONTENTS OF SOME PLANTS THAT POTENTIALLY AS THE SOLAR SOWS

ABSTRACT

Excessive sun exposure causes the epidermal tissue of the skin to be unable to fight negative effects such as skin disorders ranging from mild dermatitis to skin cancer, so skin protection is needed such as the use of sunscreen, many plants in Indonesia contain phenolic and flavonoid compounds that can potentially act as sunscreens. This study aims to determine the chemical content of several plants that have potential as sunscreen.

Where this research was conducted through data collection from several scientific research journals. The data collection is done online using Google, Google Scholar. Based on the data obtained from several scientific research journals, it can be stated that some plants have the potential to act as sunscreens, by looking at the content they have, namely phenolic and flavonoids. From several journals with different plants, it shows the highest SPF value, namely the ethanol extract of 96% of Sembung Rambat Plants (*Mikania micrantha Kunth*) with an SPF value of 42.8810 with a total flavanoid compound of 1.175%.

Keyword :Chemical Content, Literacy Studies, Sunscreen, Sun Protection Factor (Spf)

INTRODUCTION

The sun is a source of life for mankind and the earth not always had an impact that profitable because it could create a loss in human skin. Ultraviolet light contained in the sun may hurt the skin. When exposure of the sun is redundant it will cause harmful effects. [1]

Sunlight considered a major factor of various skin problems, ranging from sunburn, skin pigmentation, skin aging, furthermore skin cancer. Leather radiated UV ray will appear darker, wrinkled, dull, dry, arising blackish brown spots, until skin cancer.[2]

The preparations ingredients of nature is considered more safe to use and has another negative effect which affected fewer than the use of chemical. Supported by Indonesian natural wealth, the cosmetics industry can use fitoconstituen from diverse plants for an antidote UV light.[3]

Sunscreen preparations are recommended to be used to prevent or minimize the harmful effects of UV rays on the skin. The bad effect of UV rays on the skin is usually can be minimized by the use of materials that are UV protective. The bad effects of UV rays on the skin usually cause damage to the skin which can affect one's health and appearance[4]. Sunscreen compound is a substance that contains skin protective ingredients against sunlight so that UV rays cannot enter the skin (preventing skin irritation due to radiation). Sunscreen can protect the skin by spreading sunlight or absorbing solar radiation energy that hits the skin, so that the radiation energy does not directly hit the skin [5]

Hamid et al. (2010) said that phenolic compounds and flavonoids are natural antioxidants that are safer than synthetic antioxidants because they are able to reduce free radicals in the human body, thus preventing degenerative diseases. [6]

Phenolic compounds, especially the flavanoid group, have potential as sunscreens because of the presence of chromophore groups (conjugated single double bonds) which can absorb both UVA and UVB rays. Flavonoids show a strong absorption band in the ultraviolet light spectrum and visible light spectrum[7].

Based on this, researchers are interested in conducting literature review, which about the chemical content of several plants that have the potential as sunscreen.

METHODS

This research method is a literature review from 2017 to 2020 by reviewing journals about the chemical content of several plants that have the potential as sunscreen. Literature review is a method used to collect data or sources related to a particular topic that can be obtained from various sources such as journals, books, the internet and other literature. These libraries are downloaded from several databases such as Science Direct, Pubmed, and Google Scholar. The keywords used in the search for information were "total phenolic and flavanoid compounds and sunscreen activity".

1. Inclusion criteria

The inclusion criteria of this study include search results on Google Scholar and PubMed with the keywords "total compound and sunscreen activity", the researchers found 15,900 journals that match these keywords. After being selected based on a maximum journal publication period of 10 years (2010-2020), Indonesian and English language journals, original research, national journals, up to 5 journal titles.

2. Exclusion criteria

Based on search results on Google Scholar and PubMed with the keywords "total phenolic compounds and flavonoids, and sunscreen", researchers found 15,900 journals that match these keywords. 7,260 journals were selected and excluded because the time span was below 2010. Then they were screened, 578 journals were excluded because full text articles were not available. Feasibility assessment of 250 full text journals was carried out, journals that were duplicated and did not meet the inclusion criteria were excluded as many as 230 journal titles. Selection of journals based on: extraction method, 96% solvent, total phenolic and flavanoid compounds, and sunscreen activity.

RESULTS AND DISCUSSION

a. Results :

Table 1. The results of a literature study on the chemical content of several plants that have potential as sunscreens

Sample	Solvent	Extraction method	Total compound	SPF value	Sources
Avocado seeds (<i>Persea americana</i> Mill.)	Ethanol 96%	Maceration	Phenolic : 6,41 mg	8,02	Suhaenah, A, Widiastuti, H, & Arafat, M 2019, 'The Potential of Avocado Seed (<i>Persea americana</i> Mill.) Ethanol Extract as Sunscreen
			Flavanoid : 1,90 mg		
Corn cobs and hair (<i>Zea mays</i> L.)	Ethanol 96%	Maceration	Corn cobs extract Phenolic : 20,886 mg/G	7,985	Kusriani, H, Marliani, L, & Apriliani E 2017, 'Antioxidant and Sunscreen Activity of Corn Cob and Hair (<i>Zea mays</i> L.).
			Corn hair extract Fenolik : 26,060 mg/G	20,784	

Sembung vine plants (<i>Mikania micrantha</i> Kunth)	Ethanol 96%	Maceration	Flavanoid : 1,175%	42,8810	Susanti, E, & Lestari, S 2019, 'Sunscreen Activity Test of In Vitro Ethanol Extract of Sembung Plants (<i>Mikania micrantha</i> Kunth).
Marpuyan leaves (<i>Rhodamnia cinerea</i> Jack.)	Ethanol 96%	Maceration	Flavanoid : 0,1033 $\mu\text{g}/\text{mg}$	20,7	Nasution, MR, dkk. 2020, 'Determination of Sunscreen Activity Ethanol Extract of Marpuyan Leaves (<i>Rhodamnia cinerea</i> Jack.) by In Vitro '.
			Phenolic : 0,0983 $\mu\text{g}/\text{mg}$		
Black Rice (<i>Oryza Sativa</i> L. Indica)	Ethanol 96 %	Maceration	Flavanoid : 37,75 \pm 0,23 mg	10,37	Fanani, Z, Masithoh, RA, & Wariana KM 2019, 'Analysis of Sunscreen Potential of Black Rice (<i>Oryza Sativa</i> L. Indica) '.

b. Discussion

Sunscreen is a cosmetic preparation that is used with the intention of reflecting or absorbing UV rays so as to reduce the amount of UV radiation that is harmful to the skin [8].

Sunscreen compound is a substance that contains skin protective ingredients against sunlight so that UV rays cannot enter the skin (preventing skin irritation due to radiation). Sunscreen can protect the skin by spreading sunlight or absorbing solar radiation energy that hits the skin, so that the radiation energy does not directly hit the skin [9].

Based on its working mechanism, the active ingredients of sunscreens are divided into two, namely the physical blocking mechanism (reflecting solar radiation) and the chemical absorbing mechanism (absorbing solar radiation). Physical sunscreens work by reflecting ultraviolet radiation, their ability to block UV rays from penetrating the deepest layers of the skin, namely the dermis tissue and even to the hypodermis by blocking or reflecting and dissipating UV light energy, and is effective in the UV-A and UV-B radiation spectrum, while chemical sunscreens, their mechanism of action absorbs ultraviolet radiation by absorbing solar energy radiation before it reaches the skin, can absorb nearly 95% of UV-B radiation which can cause sunburn (burns) [10].

Flavonoids have potential as sunscreens because of the presence of chromophore groups that generally give plants their color. The chromophore group is a conjugated aromatic system that causes the ability to absorb light strongly in the UV light wave length range (Putri, Kartamihardja, & Lisna 2019, p. 33). The largest group of phenolic compounds are flavonoids. Each plant generally contains one or more flavonoid group compounds and has a distinctive composition of flavonoid content [11].

According to research by [12] using a sample of avocado seeds (*Persea americana* Mill.) By using the maceration method and using 96% ethanol solvent, based on this research, the total phenolic compounds of avocado seeds (*Persea americana* Mill.) were obtained, namely 6, 41 mg and the total flavanoid compound of avocado seed (*Persea americana* Mill.) was 1.90 mg, then calculated the value of the Sun Protection Factor, based on the research results obtained the SPF value of avocado seed ethanol extract (*Persea americana* Mill.) has the highest SPF value at concentrations of 1000 ppm with an SPF value of 8.02 which belongs to the maximum protection category.

According to research by Kusriani, Marliani, & Apriliani (2017) using samples of corn cobs and hair (*Zea mays* L.) using the maceration method and using 96% ethanol solvent, based on this research, the total results of phenolic compounds from corn cobs extract (*Zea mays* L.) was 20.886 mg / G and the total phenolic compound from corn hair extract (*Zea mays* L.) is 26.060 mg / G, then the Sun Protection Factor value is calculated and it is found that the SPF value of corn cobs extract (*Zea mays* L.) is 7.985 and the SPF value of maize hair extract was 20,784 (*Zea mays* L.).

According to Susanti & Lestari's research (2019) using a sample of sembung vine (*Mikania micrantha* Kunth) using the maceration method and using ethanol solvent, based on this research, the total results of the flavonoid compound of the sembung creeper (*Mikania micrantha* Kunth) were obtained, namely 1.175% and the calculation of the value Sun Protection Factor using a concentration of 250 ppm has a good sunscreen activity with a percent value of erythema transmission, a percent value of pigmentation transmission in the sunblock category and an SPF value of 42.8810 with a high protection category.

According to Nasution, et al. (2020), based on research conducted using marpuyan leaf plants (*Rhodamnia cinerea* Jack.) Using maceration methods and ethanol solvents, while the total marpuyan leaf flavanoid compounds (*Rhodamnia cinerea* Jack.) were 0.1033 μg / mg and phenolic 0.0983 μg / mg. From this research, the calculation of the value of the Sun Protection Factor showed that the ethanol extract of marpuyan leaves (*Rhodamnia cinerea* Jack.) had a strong sunscreen activity on a test concentration of 1000 g / mL with an SPF value of 20.7.

Fanani, Z, Masithoh, RA, & Wariana KM (2019), based on research conducted using black rice plants (*Oryza Sativa* L. Indica) using maceration methods and 96% ethanol solvent, as for the total black rice flavanoid compound (*Oryza Sativa* L. . Indica), namely 37.75 ± 0.23 mg. From this research, the calculation of the value of the Sun Protection Factor was carried out. The results showed that the ethanol extract of black rice (*Oryza Sativa* L. Indica) had sunscreen activity with maximum protection obtained at a concentration of 500ppm with an SPF value of 10.37.

Based on the journal review above, it can be concluded that some plants contain phenolic and flavanoid compounds which can be potential as sunscreens. From several journals with different plants, it shows the highest SPF value, namely the ethanol extract of 96% of Sembung Rambat Plants (*Mikania micrantha* Kunth) with an SPF value of 42.8810 with a total flavanoid compound of 1.175%.

The phenolic compounds found in plants serve to protect plant tissues against damage caused by solar radiation. Phenolic compounds, especially the flavonoid group, have potential as sunscreens because of the presence of chromophore groups that can absorb UV rays, thereby reducing their intensity on the skin [12].

CONCLUSION

Based on several research journals on the chemical content of several plants that have potential as sunscreens, some plants contain phenolic and flavanoid compounds. So it can be concluded that some plants can be potential as sunscreens by looking at the presence of phenolic compounds and flavonoids contained. The highest Sun Protection Factor value was in the ethanol extract of 96% of the Sembung Rambat Plant (*Mikania micrantha* Kunth) using the maceration extraction method with an SPF value of 42.8810 with a total flavanoid compound of 1.175%.

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