

DETERMINATION OF ETHANOL EXTRACT SUNSCREEN POTENTIAL OF RAMBUTAN RIND (*Nephelium lappaceum* L.)

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ABSTRACT

A sunscreen research to Determine the potential of rambutan rind (*Nephelium lappaceum* L.) ethanol extract has been conducted. This study aims to Determine the SPF value, percent transmission of erythema (% Te), and percent transmission of pigmentation (% Tp) of rambutan rind (*Nephelium lappaceum* L.) ethanol extract by using UV-VIS spectrophotometer.

Sunscreen potential determination of rambutan rind extract is done based on the SPF value measured at a wavelength of 290-400 nm, the calculation method% of% Te and Tp at a wavelength 292.5 to 372.5 nm at concentration 10, 20, 40, 80, and 160 ppm by using a UV-VIS spectrophotometer.

The results Showed that the SPF value of the extract at concentration of 10 ppm, 20 ppm, 40 ppm, 80 ppm, and 160 ppm respectively were 1.12; 1.23; 1.56; 2,37; and 5.32. The value of% Te at concentration of 10 ppm, 20 ppm, 40 ppm, 80 ppm, and 160 ppm respectively were 77.21; 62.87; 38.86; 16.18 and 3.10. The value of% Tp at concentration of 10 ppm, 20 ppm, 40 ppm, 80 ppm, and 160 ppm respectively were 88.01; 81.62; 68.41; 49.65 and 25.16. Obtained from the values, rambutan rind extract at concentration of 80 ppm has an SPF value of 2:37 the which means it has the potential for a minimum of sunscreen protection while at a concentration of 160 ppm, it has an SPF value of 5:32 the which means it has the potential of middle sunscreen protection. Rambutan rind extract at concentration of 80 ppm has a potential to protect against UV rays in suntan category with the value of percent tranmission erythema (% Te) by 16.18 and percent transmission of pigmentation (% Tp) by 49.65. At concentration of 160 ppm, it has a potential to protect against UV rays in extra protection category with the value of percent tranmission erythema (% Te) by 36.18 and percent transmission of pigmentation (% Tp) by 25.16 roomates includes in total blocks category.

Keyword: rambutan rind, SPF, % Te, % Tp, sunscreen

BACKGROUND

Excessive exposure to sunlight on the skin causing a brownish color and dryness of the skin (scaly). In addition, excessive sun exposure can provide other adverse effects include erythema and skin cancer. The effect depends on the duration and frequency of

exposure, the intensity of the sun, and each individual's susceptibility to sunlight.

The skin is exposed to sunlight for 6-20 hours will produce erythema which can further lead to browning of the skin (*tanning*). *Tanning* is a quick look 1

hour after the skin is exposed and then disappear within 4 hours, and did not look for the formation of new melanosomes. *Tanning* is slow due to the formation of new melanosomes slowly and only visible within 72 hours of the exposure with a wavelength of 320-500 nm. A similar reaction occurs also in *sunburn* (290-320 nm) (Wihelmina, 2011: 11).

Sunscreens are cosmetic ingredients that are physically or chemically inhibit the penetration of UV rays into the skin. Chemical sunscreens for example benzofenondan antarnilat can absorb the radiation energy. Physical sunscreens for example, titanium dioxide and zinc oxide that can reflect light. Physical sunscreens can withstand UV A and UV B sunscreen unisex in nature, such as phenolic compounds found in plants that protect plant tissues against1. damage caused by solar radiation. One example of phenolic compounds are flavonoids.

The effectiveness of sunscreen preparations are based on the determination of the value of *Sun Protecting Factor* (SPF) which describes the ability of a sunscreen to protect the skin from eritema. SPF defined as the amount of UV energy required (in this case is UV B) to cause MED (*Minimal Erytemal Dose*) on skin that is protected product or active substance sunscreen compared to the amount of energy required to cause MED without protection product or active substance sunscreen (Susanti et al., 2012:

62). SPF is intended for protection against UV B and are not specifically designed to resist UV A (Zulkarnain et al., 2013: 3). While protection against UV A is expressed in the APF. APF (*UV A Protecting Factor*) is the ratio between the amount of UV-A rays that cause *tanning* is required for minimal (*Dose Tanning Minimal = DTM*) on sunscreen-protected skin to the amount of solar light energy needed to cause minimal *tanning* on unprotected skin veil Solar (Shovyana et al., 2013: 111).

MATERIALS RESEARCH

Ingredients: Distilled water, aluminum foil, 70% ethanol, and rambutan skin.

RESEARCH METHODS

Sample Preparation

a. Samples

Rambutan fruit skins that have been taken cleaned, then dried. Once dry, peel rambutan ready to be extracted.

b. Extraction of sample

Rambutan fruit peel powder 500 grams macerated with ethanol 70% as much as 5 liters for 3 x 24 hours at room temperature. The solution obtained is then filtered with filter paper and then evaporated with a vacuum desiccator so that the resulting dry extract as much as 13.63 grams.

2. Potential Determination of Sunscreen

Made of 200 ppm stock solution in which 20 mg of extract dissolved in 100 ml

of ethanol PA. Then made dilution (0.5 ml, 1 ml, 2 ml, 4 ml and 8 ml) to produce a concentration [10 ppm], [20 ppm], [40 ppm], [80 ppm], and [160 ppm] , Then measure the absorbance of each extract at a wavelength of 290-400 nm. SPF value is calculated, percent transmission and transmission erythema pigmentation.

OBSERVATION RESULT

Table 1. The potential value of sunscreen extract

Pengukuran	Konsentrasi				
	10 ppm	20 ppm	40 ppm	80 ppm	160 ppm
SPF	1,12	1,23	1,56	2,37	5,32
% Te	77,21 %	62,87 %	38,86 %	16,18 %	3,18 %
% Tp	88,01 %	81,62 %	68,41 %	49,65 %	25,16 %

DISCUSSION

Leather dust extraction rambutan (*Nephelium lappaceum* L.) is done by maceration using ethanol penyari fluid 70. The use of maceration method is a method that is effective in extracting a crude drug, the advantages of using this method is that it can avoid the damage of active compound contained in a simplicia that probably caused by the temperature factor. However, in using this method there are still many shortcomings including, that takes a long time and requires a fair amount of solvent (Shifa, 2010: 61).

Maceration process is carried out as 3x24 hours with occasional stirring and the use of new solvent until no longer extracted compounds are characterized by

clear solvent color or colorless (Shifa, 2010: 61). Ethanol is an organic solvent that can attract most of the bioactive compounds found in botanicals, also by Prashant Tiwari (2011), maceration method with liquid ethanol penyari used to attract phenolic compounds that have an effect as a UV protection of the skin of the fruit rambutan (*Nephelium lappaceum* L.). After maceration, fluid results maceration dried using vacuum desiccator to obtain a dry extract. Skin dry extract of rambutan (*Nephelium lappaceum* L.) is then measured its potential sunscreen with UV-Vis spectrophotometer at a concentration of 10 ppm, 20 ppm, 40 ppm, 80 ppm, and 160 ppm.

Measurement of concentrations of 10 ppm, 20 ppm, 40 ppm, 80 ppm, and 160 ppm is based on research conducted by Suparmi (2012) that measures the antioxidant activity of the extract of rambutan skin at concentrations of 10 ppm, 20 ppm, 40 ppm, 80 ppm, and 160 ppm. The results, which rambutan fruit skin has the same ability with vitamin E in inhibiting free radicals linoleic acid.

SPF values obtained from the extract of rambutan skin measured at a concentration of 10 ppm, 20 ppm, 40 ppm, 80 ppm, and 160 ppm by using UV-Vis spectrophotometry (290-400) nm. Measurements were made at intervals of 5 nm in triplo. At a concentration of 10 ppm of its SPF value are respectively 1.12; 1.13 and 1.13 with an average SPF of

his, namely 1.12. At a concentration of 20 ppm of its SPF value are respectively 1.25; 1.23 and 1.23 with an average SPF value of its 1.23. At a concentration of 40 ppm of its SPF value are respectively 1.6; 1.54 and 1.54 with an average SPF value of 1.56. At 80 ppm of concentration of its SPF value are respectively 2.34; 2.39 and 2.39 with an average SPF value of 2.37. While at a concentration of 160 ppm of its SPF value are respectively 5.26; 5.33 and 5.32 with an average SPF value of 5.32. At a concentration of 80 ppm has a protective effect, which is entered in the category of a minimum level of protection a sunscreen so does the concentration of 160 ppm has a protective effect, namely the category of medium-level protection. The FDA classifies the product or active ingredient based sunscreen SPF value, ie the value of 2 to 4 is the minimum protection, a value of 4 to 6 as a protective medium, grades 6 to 8 is an extra protection, the value of 8 to 15 is maximum protection and a value above 15 as the ultra protection (Damogalad, 2013: 42).

Potential sunscreen can be seen also by the value of the percentage of erythema (% Te) and the percent transmission of pigmentation (% Tp). Absorbance measurements of each extract was measured every 5 nm in the wavelength range from 292.5 to 372.5 nm. From the calculation of percent transmission of erythema and pigmentation percent transmission at a concentration of 10 ppm were conducted triplo row has a

value of% Te 77.04%; 76.9% and 77.7% with an average value% Te is 77.21% while the value of Tp% respectively ie 87.84%; 87.8% and 88.4% with an average value% Tp is 88.01%. At a concentration of 20 ppm were conducted triplo row has a value of% Te 62.24%; 62.61% and 63.78% with an average value% Te is 62.87% while the value of Tp% respectively ie 81.21%; 81.35% and 82.31% with an average value% Tp is 81.62%. At a concentration of 40 ppm were conducted triplo row has a value of% Te 39.2%; 38.7% and 38.74% with an average value% Te is 38.86% while the value of Tp% respectively, are 68.5%; 68.3% and 68.45% with an average value% Tp is 68.41%. At a concentration of 80 ppm were conducted triplo row has a value of% Te 16.55%; 16.07% and 15.94% with an average value% Te is 16.18% while the value of Tp% respectively, are 50.1%; 49.56% and 49.29% with an average value% Tp is 49.65%. Meanwhile, at a concentration of 160 ppm conducted triplo consecutive Te value% 3.28%; 3.18% and 3.10% with an average value% Te was 3.18% while the value of Tp% respectively ie 25.88%; 25.35% and 25.15% with an average value% Tp is 25.16%.

Sunscreen preparations can be categorized as *Sunblock* (preparation that can absorb nearly all UV-B and UV-A) when the percentage of transmission erythema <1% and the percentage of 3-40% transmission pigmentation. If the percentage of transmission erythema 6-

18% and 45-86% pigmentation transmission percentage categorized as *suntan* or can be said of a material that absorbs most of the UV-B rays and absorb little UV-A rays (Soeratri, 2005: 117).

Corresponding measurements obtained from the value of percent erythema extract at a concentration of 10 ppm was 77.21% and the extract was 88.01 percent pigmentation%, meaning that rambutan skin extract can not provide protection against pigmentation and can not prevent the skin to avoid redness / erythema. Value percent erythema extract at a concentration of 20 ppm was 62.87% and the percent pigmentation is 81.62% extract, extract meaning rambutan skin can provide protection against pigmentation but were unable to prevent the skin to avoid redness / erythema. Value percent erythema extract at a concentration of 40 ppm was 38.86% and the percent pigmentation is 68.41% extract, extract meaning rambutan skin can provide protection against pigmentation but were unable to prevent the skin to avoid redness / eritemaartinya. Value percent erythema extract at a concentration of 80 ppm was 16.18% and the percent pigmentation is 49.65% extract, meaning rambutan skin extract at a concentration of 80 ppm can be categorized as a *suntan*, which extract may provide protection against pigmentation and also can prevent the skin from becoming there is redness / erythema. Value percent erythema extract at a concentration of 160 ppm is 3.18% which is categorized as an

extra protection and percent extract was 25.15% pigmentation and categorized as a *total block*, meaning rambutan skin extract may protect against or prevent pigmentation of the skin in order to avoid redness / erythema. This is because the extract of rambutan skin has a fairly good absorption in the UV-A and the known spectrum of UV-A rays can cause dark color of the skin (pigmentation) with a wavelength of 320-400 nm (Soerarti and Purwanti, 2004: 117).

CONCLUSION

Based on the results of research can be concluded that:

1. Bark rambutan (*Nephelium lappaceum* L.) extract has the potential of sunscreen because it has a fairly good absorption in the UV-A and UV-B.
2. Bark rambutan (*Nephelium lappaceum* L.) extract at a concentration of 80 ppm has an SPF value of 2.37 were categorized as minimal protection while at a concentration of 160 ppm has an SPF value of 5.32 and is categorized as moderate protection. Rambutan skin extract concentration of 80 ppm has a potential protection against UV light, namely *suntan* category with a value of percent transmission erythema (% Te) at 16.18 and the percent transmission of pigmentation (% Tp) of 49.65. At a concentration of 160 ppm has a potential protection against UV light, namely the

category of *extra protection* to the value per cent erythema (% Te) of 3, 18 and percent pigmentation (% Tp) at 25.16 which belongs to the category *total block*.

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