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Article

Potential Antioxidant Compounds Contained in Secang Wood (*Caesalpinia sappan L*) for Natural Skin CareNida Ni'matul Maula^{1*}, Rifqi Anjar Mustika², Sri Wahyuni³, Ulinnuha Nur Faizah⁴^{1,2,3,4} Institut Agama Islam Negeri Ponorogo, Ponorogo*Corresponding Address: wahyuniis2021@gmail.com**Article Info**

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ABSTRACT

Secang tree (*Caesalpinia sappan L.*) is generally used for traditional medicine to treat various diseases. Secang contains phenolic compounds such as gallic acid, brazilin and brazilein. As it is known that this phenolic compound has a very high antioxidant content. People generally use the sappan plant (*Caesalpinia sappan L.*) as herbal medicine, especially the wood part. The antioxidants contained in secang wood (*Caesalpinia sappan L.*) can be used to prevent premature aging of the skin and prevent free radicals. Compared to using chemicals, natural materials can produce sludge which is more easily degraded and minimizes side effects. As a result, sappan has the potential as a medicinal herbal drink, especially for skin health. The purpose of this study was to determine the potential of antioxidant compounds in sappan wood (*Caesalpinia sappan L.*) which can be an alternative natural skin care. The method used is a literature study. Literature study is a method related to using theoretical studies and various related scientific literatures. The results showed that the potential antioxidant compounds contained in secang wood (*Caesalpinia sappan L.*) can be used as an alternative to natural skin care, namely preventing free radicals, treating acne, preventing premature aging, brightening the skin, and preventing the growth of cancer cells in the skin.

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INTRODUCTION

Indonesia is a country that has various types of plants which are usually used by most people as the main ingredients for medicines, for example traditional medicines, herbal medicine or herbal drinks. Various types of plants are used as traditional medicine, which has become a tradition for generations, especially for people in rural areas. The use of natural ingredients as alternative medicines to cure diseases is increasing. This is due to the impact of natural ingredients having very small side effects, therefore natural ingredients are more guaranteed to be safe compared to chemicals. Traditional methods of treatment that use extracts from natural ingredients usually still use different sizes, for this reason research is needed which aims to find out the minimum dosage or size for the use of natural ingredients that can

be used to prevent the growth of bacteria that cause various kinds of diseases (Salni et al, 2013). Currently, many people use extracts from natural ingredients, especially from plants, as functional drinks. Functional drinks have the main ingredients, namely spices, these traditional medicines are generally served with types of health drinks such as herbal medicine, juice and syrup and some even come in the form of instant drinks (Miksusanti et al, 2011). Among the herbal plants that can be used as traditional medicine is the secang tree with the scientific name *Caesalpinia sappan L.*. The secang tree (*Caesalpinia sappan L.*) is a herbal plant that lives naturally in secondary forests. The traditional use of the sappan plant (*Caesalpinia sappan L.*) is quite widely known by the public. The part of this plant that is often used as herbal medicine is the wood or wood extract. One of the benefits of secang wood (*Caesalpinia sappan L.*) is that it can be used for natural skin care.

The skin is the outermost organ of the human body which has the function of protecting the body from attacks by unknown objects and from negative environmental impacts. Nowadays, beauty is considered a basic need, especially for young people, both women and men. This is because beauty problems which include skin health will receive more priority attention than other problems. Various forms of damage that occur to the skin, especially those on facial skin, can result in health problems and can also affect the beauty of facial appearance. One of the factors that causes damage to the skin is free radicals. Excessive free radicals can cause chronic and degenerative diseases because these compounds attack healthy body cells. One of the benefits of secang wood extract (*Caesalpinia sappan L.*) is that secang (*Caesalpinia sappan L.*) has a fairly high antioxidant content compared to vitamin C and vitamin E contained in it (Suhartati and Sari, 2016). Antioxidants themselves are molecules that can slow down and inhibit the oxidation process. Antioxidants are known as compounds that can inhibit oxidation reactions by stopping the chain reaction process caused by the presence of free radicals. Antioxidants are generally used as chemical molecules that can be easily oxidized, for example living cells, food and other products. Antioxidants that are usually used in food ingredients are synthetic antioxidants, for example BHT and BHA, but these antioxidants can also cause negative impacts, as is the case with other synthetic food additives which are characterized by containing toxins.

Antioxidants can deal with free radicals and their negative impacts, such as causing premature aging, so these antioxidants are compounds that are also useful for treating premature aging. The purpose of writing this article is to determine the potential of antioxidant compounds contained in secang wood (*Caesalpinia sappan L.*) as an alternative that can be used for natural skin care. It is hoped that this research can increase people's knowledge about secang wood, where secang wood is a natural herbal plant that can be used as a natural therapy and can also be used as an alternative solution to give the impression of beauty and natural beauty to the skin, especially for women.

METHODS

The method used in this research is a literature study. Literature study is a method related to literary studies which refers to theoretical studies and various sources that cannot be separated from scientific literature. Data sources are obtained from related literature such as journals and scientific articles related to the selected subject or title. This report was prepared with the principle of simplicity to make it easier to understand the antioxidant content of secang wood (*Caesalpinia sappan L.*). The data presented as an in-depth discussion of the antioxidant compound content in secang wood (*Caesalpinia sappan L.*) as an alternative natural skin treatment was obtained from various research sources. So that it can provide answers that contain the truth about the potential antioxidant content in secang wood (*Caesalpinia sappan L.*) from the results of various references.

RESULTS AND DISCUSSION

The sappan plant (*Caesalpinia sappan L.*) was discovered by a Spanish person named Kimichi in Brazil. In connection with the discovery of secang wood, the plant is known as "Brazilian wood". Apart from that, there are also those who claim that this secang plant originates from India through Burma, Thailand, Indo China to Malaysia and spread to Indonesia. Secang (*Caesalpinia sappan L.*) is a plant that usually grows in open ground up to a height of 1000 meters above sea level, for example in rocky mountain areas, but it is not too cold. The sappan plant (*Caesalpinia sappan L.*) has a height of around 5-10 m, the stem is woody, round and greenish brown in color. The trunk and branches have sticky spines that are curved and scattered. Secang leaves (*Caesalpinia sappan L.*) are compound leaves that are 25-40 cm long with 10-20 pairs of leaves, one opposite each other. Secang flowers (*Caesalpinia sappan L.*) are compound flowers, namely 10-40cm long compound flowers at the end of the stem, the flowers are yellow tube-shaped. Secang fruit (*Caesalpinia sappan L.*) is pod-shaped, 8-10cm long, 3-4cm wide, beak-like tip containing 3-4 seeds, black when ripe. The seeds are round and oval, 15-18 mm long and 8-11 mm wide, 5-7 mm thick, the color is brown-yellow. Secang roots are dirty brown taju roots (Hariana, 2006). Secang leaves contain around 0.20% essential oil which smells good and has no color. The stem, bark and fruit can produce red and light purple colors and yellow roots (Dianasari, 2009). This color is caused by the presence of brazilein compounds in the sappan plant (*Caesalpinia sappan L.*).

Secang wood (*Caesalpinia sappan L.*) contains phenolic compounds including *gallic acid, tannin, resin, resorcinol, brazilin, brazilein, d- α -phelandrene, oscimen*, essential oils, *alkaloids, flavonoids and saponins*. According to Sufiana and Harlia (2014), phytochemical results show that the compounds *bracilin, brasilein and flavonoids* have very high concentrations as antioxidants in gallwood. Based on various studies, phenolic compounds have high antioxidant activity. Due to its antioxidant content, bracilin has an effect that protects the body from chemical radical poisoning. Flavonoids found in sappan tree extract (*Caesalpinia sappan L.*) have many abilities to reduce or prevent the formation of free radicals. Secang Tree Extract (*Caesalpinia sappan L.*) also has better antioxidant capacity than vitamin C and vitamin E and can increase the total antioxidant unit of the body.

The results from several journals collected show that there are six sources of leaves showing the potential content of antioxidant compounds in the secang tree (*Caesalpinia appan L.*). These antioxidant compounds have various benefits for the body, especially skin health. Literature discussing the potential levels of antioxidant compounds in secang wood (*Caesalpinia sappan L.*) in natural skin care is still minimal, but several articles were found discussing this issue with the following information.

Table 1. Results of analysis of potential antioxidant compounds in secang wood (*Caesalpinia sappan L.*)

No	Work	Title	Antioxidant Potential of Secang Wood
1	Yemirta	Identify the Antioxidant Compound Content in Secang Wood (<i>Caesalpinia Sappan</i>)	In this journal research, the focus is on discussing the content of antioxidant compounds in secang wood. The journal shows that secang wood contains homoisoflavonoid compounds, red saponins, tannins, gallic acid and Brazilian phosphorus. The stems and leaves of this plant contain alkaloids, flavonoids, tannins and brazilin.
2	Siti Sa'diyah, Latifah Kosim Darusman, Wulan Triwahyuni, Irmanida	Effectiveness of anti-acne cream for secang wood (<i>Caesalpinia sappan</i>) against Propionibacterium acnes on rabbit skin	In this journal it was stated that secang wood contains more than 200 mg/g of brazilin. Secang wood can be used as a cream, and can be used as a medicine to treat acne.
3	Oktafrina	Exploration of Natural Coloring Ingredients as	In this journal, it is known that secang wood has antioxidant and anti-microbial characteristics which

No	Work	Title	Antioxidant Potential of Secang Wood
		Food Additives that are Safe and Have Bioactivity for Health. Proceedings of the National Seminar on Agricultural Technology Development	can prevent free radicals and contains pharmacological activities such as anti-inflammatory, anti-photoaging, hypoglycemia (low blood sugar levels), and anti-allergic.
4	Febriyenti, Netty Suharti, Henny Lucida, Elidahanum Husni, & Olivia Sedona	Characterization and Study of Antioxidant Activity of Ethanol Extract of Secang (<i>Caesalpinia sappan L.</i>)	In this journal research, the focus is on discussing the phenolic and flavonoid compounds in secang wood which have antioxidant effectiveness. The antioxidant impact of phenolic compounds in secang wood is due to its oxidation characteristics which are useful in neutralizing free radicals.
5	Febiani Dwi Utari, Sumirat, Muhammad Djaeni	Production of Antioxidants from Secang Wood Extract (<i>Caesalpinia sappan L.</i>) Using a Low Humidity Dryer	This journal discusses the brazilein compound obtained through extraction with distilled water which requires 120 minutes at a temperature of 40°C. The extraction results show that the antioxidant compounds of secang wood extract show very high antioxidant results.
6	Widowati	Phytochemical test and antioxidant potential of ethanol extract of secang wood (<i>Caesalpinia sappan L.</i>)	This journal notes that secang wood extract also contains terpenoid compounds. The high antioxidant activity of secang wood extract is caused by the content of terpenoids such as monoterpenes and diterpenes
7	Ulfa Nurlita dan Estri Irawati	Comparison of Antioxidant Activity of Natural Ingredients and Synthetic Ingredients (Study on Secang Wood and Vitamin C)	In this journal, secang wood (<i>Caesalpinia sappan L.</i>) has relatively strong antioxidant activity, namely 0.1136 mgQE/g

Based on the table above, it is known that secang wood (*Caesalpinia sappan L.*) contains many antioxidant compounds. This antioxidant compound has various benefits, especially for the skin, one of which is being able to overcome free radicals. Antioxidants can neutralize free radicals in the oxidation process. These free radicals are molecules found in pollution, smoke and ultraviolet light that can damage skin cells. The first journal by Yemirta focused on discussing the antioxidant compounds contained in sappan wood. In his journal, Yemirta showed that secang wood (*Caesalpinia sappan L.*) contains homoisoflavonoid compounds, red saponins, saponins, tannins, brazilin and gallic acid. It is known that plants containing flavonoid compounds have high antioxidant effectiveness. According to Yemirta, antioxidant compounds can inhibit chain reactions caused by free radicals. Antioxidants are also called scavengers which are useful for neutralizing free radicals. In the second journal, the work of Siti Sa'diyah, et al shows that the efficacy of secang extract as an anti-acne agent is made into a cream or gel by going through several processes, namely the mechanism of lipase inhibition, anti-P. Acnes. Antioxidants are known to contain active compounds from secang extract, namely *brazilin*, *protosappan A*, *protosappan B*, which have the ability to reduce the risk of tumors which can cause edema or inflammation of the skin caused by P. acnes infection. The effectiveness of secang extract made in gel form shows that the cream base can lift the extract into the epidermal cells of the skin so that it can penetrate the place where bacteria grow, namely the sebaceous glands. The results of research conducted by Siti Sa'diyah, et al showed that secang wood contains more than 200 mg/g of *brazilin* compounds which can be used to treat acne.

Oktaf Rina's research results stated that secang wood (*Caesalpinia sappan L.*) has antioxidant and antimicrobial properties which can prevent free radicals and has pharmacological activities including *anti-allergic*, *anti-photoaging*, *anti-inflammatory* and hypoglycemia. Inflammation is inflammation which is one of the body's mechanisms for protecting itself against infection by microorganisms, for example bacteria, viruses and fungi. Photoaging is premature aging that occurs on the skin because the skin is often exposed to UV A and UV B rays from sunlight. Quoted from the results of research conducted by Oktaf Rina regarding secang wood (*Caesalpinia sappan L.*), it is known that in secang wood (*Caesalpinia sappan L.*) there are secondary metabolite compounds in the form of *flavonoids* and *phenolics* which can ward off inflammation or are called inflammation and also can ward off premature aging. In the fourth journal, the work of Febriyanti, et al discusses the content of flavonoid and phenolic compounds contained in secang wood (*Caesalpinia sappan L.*). Febriyanti, et al have conducted research to determine the total phenolic content and antioxidant effectiveness of the ethanol extract of secang wood (*Caesalpinia sappan L.*) using the FRAP (Ferric Reducing Antioxidant Power) technique. This technique is carried out by extracting secang powder by maceration with 70% ethanol solvent. Then the results of the research showed that the total phenolic content of secang (*Caesalpinia sappan L.*) ethanol extract was 71.144 g/100 g. Febriyanti believes that the higher the total phenolic content, the higher the antioxidant activity. Based on research conducted by Febriyanti, et al, it shows that the antioxidant activity of secang ethanol extract is 13.99 mmol Fe (II)/100 g.

The results of research in the fifth journal, namely the journal by Febiani, Sumirat, and Muhammad Djaeni, show that extraction of secang wood (*Caesalpinia sappan L.*) using water can produce very strong antioxidants. This research was carried out by extracting secang wood (*Caesalpinia sappan L.*) with distilled water which then produces *brazilein* compounds. Brazilein is included in the group of flavonoid compounds as homoisoflavonoids. *Brazillein* color functions as an antioxidant. Brazilein from secang wood (*Caesalpinia sappan L.*) can be obtained using extraction techniques, but in the form of a less stable solution, it requires a drying process until it becomes powder. The sixth journal, namely the work of Wahyu Widowati in his research on secang wood extract (*Caesalpinia sappan L.*), in his research it was discovered that secang wood extract (*Caesalpinia sappan L.*) contains terpenoid compounds, very strong phenols, and also contains high levels of flavonoids. According to Wahyu Widowati, secang wood extract has high antioxidant effectiveness, namely 80.46-89.13%. The seventh journal, namely the work of Ulfa Nurlita and Estri Irawati in their research on flavonoid levels in secang wood (*Caesalpinia sappan L.*) shows relatively strong antioxidant results.

Based on several research journals above, it can be seen that the antioxidant compounds in secang wood (*Caesalpinia sappan L.*) include *flavonoids*, *brazilin*, *brazilein*, *phenols*, *terpenoids*, and *tannins*. The high content of *flavonoid* compounds in secang wood (*Caesalpinia sappan L.*) causes high anti-bacterial activity. The *flavonoid* and *phenolic* compounds in secang wood (*Caesalpinia sappan L.*) are efficacious in preventing oxidative damage to body cells, especially skin cells and are able to prevent the occurrence of free radicals. Damaged body cells caused by the influence of free radicals can be easily prevented by using sappan wood (*Caesalpinia sappan L.*). The brazilin compound contained in secang wood (*Caesalpinia sappan L.*) can also prevent and treat acne. This *brazilin* compound has anti-bacterial characteristics so the bacteria that cause acne can be easily treated and killed. Secang wood (*Caesalpinia sappan L.*) also has anti-inflammatory and anti-inflammatory properties so it can be used to cure acne. It can be used by soaking secang wood in hot water and using it to wash your face when you are experiencing acne. With regular use, acne can slowly be treated. The antioxidant compound content in secang wood can also prevent symptoms of premature aging. Signs of premature aging, such as wrinkles and sagging skin,

can be treated easily using secang wood extract. (*Caesalpinia sappan L.*). How to serve secang wood (*Caesalpinia sappan L.*) can also be done by making it into a drink to drink. Consuming secang wood wedang (*Caesalpinia sappan L.*) regularly can make the skin healthier, smoother, and free from bacterial infections. Another way to prepare secang wood is to take the extract. Secang wood extract (*Caesalpinia sappan L.*) is obtained through an extraction process. Extraction is a method used to separate a mixture of various substances into separate components. When making secang wood extract (*Caesalpinia sappan L.*) you can use water as an extractant because if you use an organic solvent it is considered incorrect or inappropriate because the resulting extract is used for drinks. The extraction process is carried out by heating secang wood and water with a ratio of 1:25 secang wood and water and takes about 20 minutes. Secang wood (*Caesalpinia sappan L.*) and water are heated until boiling so that the active components contained in sappan wood (*Caesalpinia sappan L.*) can be extracted completely. When boiling secang wood, the tannin and brazilin compounds dissolve in water. The tannin and brazilin compounds contained in the stem of secang (*Caesalpinia sappan L.*) are complex compounds that have anti-bacterial characteristics so they are effective when used in treating various skin health problems such as acne, irritation, and can also prevent the growth of cancer cells on the skin. However, further research is needed regarding this effectiveness. Therefore, apart from diligently consuming it, it must be balanced with a healthy lifestyle, exercising diligently, consuming nutritious food, and avoiding stress.

CONCLUSION

From the data above, the antioxidant compounds most commonly contained in secang wood are *brazilin*, *brazilein*, *flavonoids*, *phenols*, *terpenoids*, and *tannins*. These compounds have high antioxidant content so they can be used as natural skin care. The antioxidants contained in secang wood (*Caesalpinia sappan L.*) are anti-bacterial and anti-inflammatory so they can be used as a natural treatment and also an alternative solution for natural beauty care for the skin, especially for women. There are various ways of serving secang wood as natural skin care, namely it can be used as a face wash, made into a drink, and even the extract can be taken. The potential content of antioxidant compounds in secang wood as natural skin care is that it can prevent free radicals, prevent premature aging, treat acne, prevent skin irritation, brighten the skin, and can also prevent the growth of cancer cells on the skin. Even though secang wood has health benefits, especially skin health, it should not be used as the main treatment. If you want to use it as a treatment, you should consult a doctor first.

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