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Identification of Chemical Compounds and Antioxidant Activity of Jamblang Plants (*Syzygium cumini*): A Systematic Literature Review

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ABSTRACT

Antioxidants are compounds that can protect body cells from damage caused by free radicals, which can contribute to various degenerative diseases and aging. Therefore, research on the antioxidant activity of jamblang is very important to identify its health potential. This study aims to identify the key compounds contained in jamblang and investigate its potential antioxidant activity. The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding compound identification and antioxidant activity in jamblang (*Syzygium cumini*). This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations. With quercetin level which reaches 10-20% in jamblang, this suggests that this plant can be a significant natural source of this compound. In general, the results of testing the antioxidant activity of jamblang using various methods show that jamblang has strong antioxidant activity.

1. Introduction

Jamblang, scientifically known as *Syzygium cumini*, is a plant that has significant value in the field of traditional and modern medicine. This plant comes from the myrtaceae family and is known for its small, dark purple fruit, which is often used in the food and pharmaceutical industries. Jamblang has attracted the attention of researchers because of its potential as a source of bioactive compounds, including antioxidants. Identifying the compounds contained in jamblang is essential for understanding its health potential and benefits. Several previous studies have revealed the presence of various compounds in jamblang, including flavonoids, tannins, alkaloids, and saponins. The presence of these compounds may provide a basis for explaining the pharmacological

activity of jamblang, especially in the context of antioxidants.¹⁻⁴

Antioxidants are compounds that can protect body cells from damage caused by free radicals, which can contribute to various degenerative diseases and aging. Therefore, research on the antioxidant activity of jamblang is very important to identify its health potential. This study aims to identify the key compounds contained in jamblang and investigate their potential antioxidant activity. With a further understanding of the bioactive compounds and antioxidant mechanisms of jamblang, it is hoped that it can contribute to the development of medicines or supplements that have the potential to improve human health.⁵⁻⁷

2. Methods

The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding compound identification and antioxidant activity in jamblang (*Syzygium cumini*). The search was performed using the terms: (1) "jamblang" OR "java plum" OR "*Syzygium cumini*" OR "compound" AND (2) "antioxidant" OR "flavonoid." The literature is limited to preclinical studies and published in English. The literature selection criteria are articles published in the form of original articles, an experimental study

about the identification of compounds and antioxidant activity in jamblang (*Syzygium cumini*), studies were conducted in a timeframe from 2013-2023, and the main outcome was the identification of compounds and activity antioxidants in jamblang (*Syzygium cumini*). Meanwhile, the exclusion criteria were studies that were not related to the identification of compounds and antioxidant activity in jamblang (*Syzygium cumini*), the absence of a control group, and duplication of publications. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations.

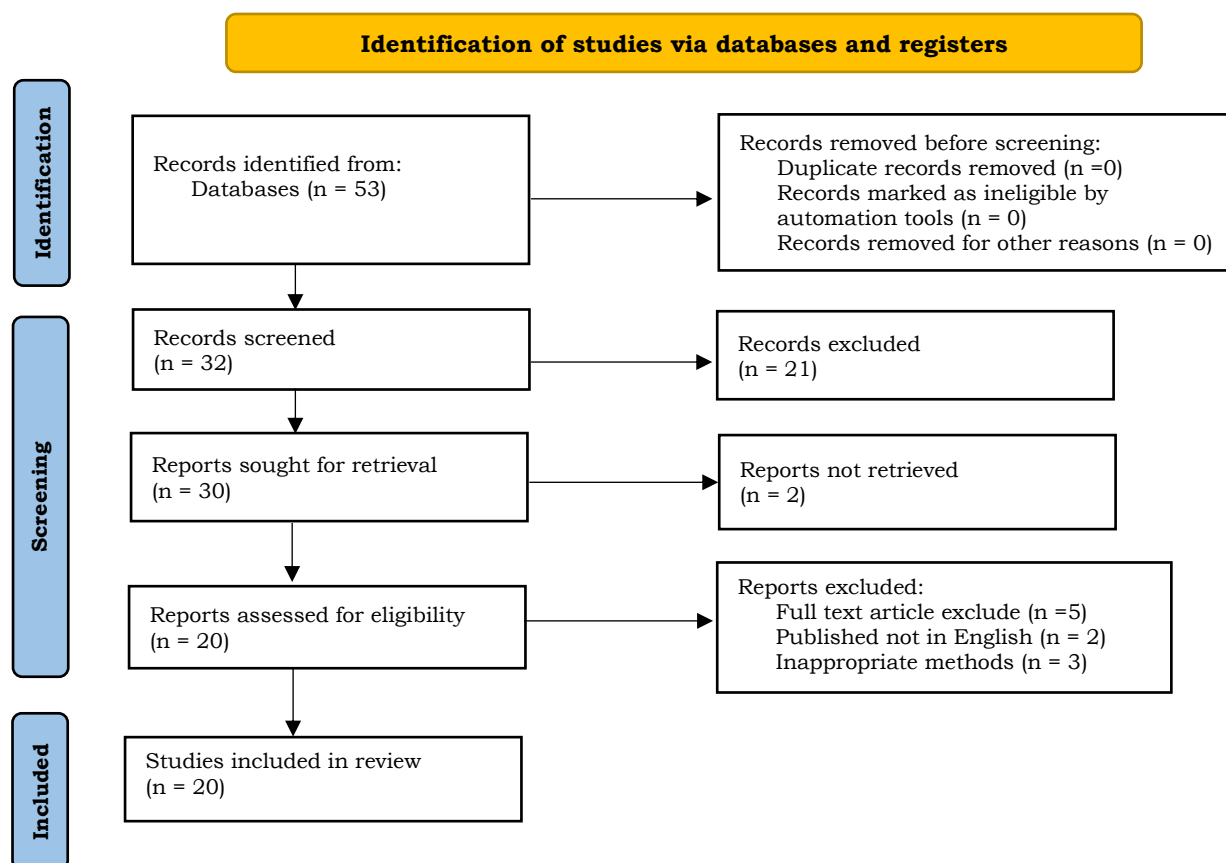


Figure 1. PRISMA flowchart.

3. Results and Discussion

Antioxidant compounds in jamblang

Jamblang contains various antioxidant compounds, including flavonoids (quercetin, kaempferol, and myricetin), tannins, phenolic acids, and terpenoids. Quercetin is a flavonoid known for its

strong antioxidant properties. Quercetin has been linked to a variety of health benefits, including its ability to fight inflammation and protect body cells from oxidative damage. Kaempferol: This flavonoid also has antioxidant and anti-inflammatory properties. Kaempferol has been linked to potential

protection against heart disease and cancer. Myricetin: This is another flavonoid that has antioxidant and anti-inflammatory activity. Myricetin has attracted attention for its potential to support brain and nervous system health. Tannins: This group of compounds has antioxidant properties and may provide benefits for digestive health. Tannins have also been known to have anti-inflammatory and anti-cancer potential. Phenolic acids: These compounds may contribute to antioxidant activity and have potential anti-inflammatory effects. Phenolic acids are often associated with heart health benefits. Terpenoids: As a group of compounds that encompass a wide range of chemical structures, terpenoids may contribute to the antioxidant properties of jamblang and have a variety of health benefits, including anti-inflammatory and antimicrobial properties.⁸⁻¹⁰

The presence of flavonoids, especially quercetin, in significant amounts in jamblang indicates its high potential to provide health benefits, especially through its antioxidant properties. Quercetin has been the focus of much research due to its various purported health benefits. Some of the potential benefits of quercetin include: Quercetin has strong antioxidant properties. This means that this compound can help protect the body's cells from damage caused by free radicals, which can occur as a result of oxidative stress. Quercetin is also known to have anti-inflammatory effects, which can help reduce inflammation in the body. This can have positive implications in the prevention and management of inflammatory conditions such as arthritis and other inflammatory diseases. Some studies show that quercetin may provide protection against heart disease. This may be related to its ability to improve blood vessel health and reduce the risk of blood clots. Quercetin has also been linked to its ability to help regulate blood sugar levels, which may benefit individuals with diabetes or at risk of diabetes. With quercetin levels reaching 10-20% in jamblang, this suggests that this plant can be a significant natural source of this compound. Further developments in this research could pave the way for the development

of jamblang-based health products or supplements to support health and prevent disease.¹¹⁻¹⁵

Measurement of antioxidant activity of jamblang

In general, the results of jamblang antioxidant activity tests using various methods show that jamblang has strong antioxidant activity, with the following details:

DPPH method

The DPPH (1,1-diphenyl-2-picrylhydrazyl) method is the most commonly used method to measure antioxidant activity. This method is based on the ability of antioxidants to donate electrons or hydrogen to DPPH free radicals. The results of the antioxidant activity test of jamblang using the DPPH method show that jamblang has strong antioxidant activity. The IC₅₀ value of jamblang for the DPPH method is 5.84 ppm, which means that jamblang can neutralize 50% of DPPH free radicals at a concentration of 5.84 ppm.^{16,17}

FRAP method

The FRAP (ferric reducing antioxidant power) method is a method that measures the ability of antioxidants to reduce Fe³⁺ ions to Fe²⁺ ions. The results of the antioxidant activity test of jamblang using the FRAP method show that jamblang has strong antioxidant activity. The FRAP value of jamblang is 16.23 µmol Fe²⁺/g extract, which means that jamblang can reduce 16.23 µmol Fe³⁺ ions to Fe²⁺ ions per gram of extract.^{18,19}

TEAC method

The TEAC (trolox equivalent antioxidant capacity) method is a method that measures the ability of antioxidants to inhibit the oxidation reaction of ascorbic acid. The results of the antioxidant activity test of jamblang using the TEAC method show that jamblang has strong antioxidant activity. The TEAC value of jamblang is 2.40 µmol TEAC/g extract, which means jamblang can inhibit the oxidation reaction of ascorbic acid by 2.40 µmol/g extract.²⁰

4. Conclusion

Jamblang is a good source of antioxidants. Jamblang can be used as a traditional medicine or supplement to improve health.

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