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The Pharmacological Activity of Jamblang Plant (*Syzygium cumini* (L) Skeels) Based on Solvent Polarity: A Systematic Literature Review

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A B S T R A C T

In recent years, there has been growing interest in the potential medicinal benefits of *Syzygium cumini*. This is due in part to the plant's rich content of antioxidants, flavonoids, and other phytochemicals. These compounds have been shown to have a variety of beneficial effects, including antidiabetic, anti-inflammatory, and anti-cancer properties. The solvent plays an important role in the extraction of compounds from *Syzygium cumini*. This study aimed to conduct a systematic review to explore the potential of jamblang plants (*Syzygium cumini*) based on solvent polarity. The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding the potential of jamblang in medicinal uses based on solvent polarity. This study follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) recommendations. The solvent plays an important role in the extraction of compounds from *Syzygium cumini*. The solvent must be able to dissolve the target compounds, but it must not also dissolve other compounds that are not desired. The solvent must also be compatible with the plant material and the extraction method. The solvent must be of the same polarity as the target compounds. For example, polar solvents such as water and ethanol are good for extracting polar compounds, such as flavonoids and anthocyanins. Non-polar solvents such as acetone and methanol are good for extracting non-polar compounds, such as terpenes and steroids.

1. Introduction

Syzygium cumini, also known as jamblang, java plum, black plum, or Malabar plum, is a tropical tree native to India, but it is now grown in many tropical and subtropical regions around the world, including Indonesia. The various parts of the plant, including the leaves, bark, fruits, and seeds, have been used to treat a variety of ailments, both in traditional medicine and in modern clinical trials. In recent years, there has been growing interest in the potential medicinal benefits of *S. cumini*. This is due in part to the plant's rich content of antioxidants, flavonoids, and other phytochemicals. These compounds have been shown to have a variety of beneficial effects, including antidiabetic, anti-inflammatory, and anti-cancer properties.[1-3]

The seeds of *S. cumini* contain a compound called jambolin, which has been shown to inhibit the breakdown of starch into sugar. This can help to lower blood sugar levels in people with diabetes. The leaves and bark of *S. cumini* contain compounds that have anti-inflammatory properties. This can help to reduce inflammation in the body, which is associated with a number of diseases, including arthritis, asthma, and cancer. The fruits, leaves, and bark of *S. cumini* contain high levels of antioxidants. These compounds can help to protect the body against damage from free radicals, which are unstable molecules that can cause cell damage. Some studies have shown that compounds in *S. cumini* may have anti-cancer properties. For example, one study found that the leaves of *S. cumini* were able to inhibit the growth of

cancer cells in the liver.[4,5]

The solvent plays an important role in the extraction of compounds from *Syzygium cumini*. The solvent must be able to dissolve the target compounds, but it must not also dissolve other compounds that are not desired. The solvent must also be compatible with the plant material and the extraction method. The solvent must be of the same polarity as the target compounds. For example, polar solvents such as water and ethanol are good for extracting polar compounds, such as flavonoids and anthocyanins. Non-polar solvents such as acetone and methanol are good for extracting non-polar compounds, such as terpenes and steroids.[6,7] This study aimed to conduct a systematic review to explore the potential of jamblang plants (*Syzygium cumini*) based on solvent polarity.

2. Methods

The literature search process was carried out on various databases (PubMed, Web of Sciences, EMBASE, Cochrane Libraries, and Google Scholar) regarding the potential of jamblang in medicinal uses based on solvent polarity. The search was performed using the terms: (1) "jamblang" OR "java plum" OR" *Syzygium cumini*" OR" *Syzygium cumini* in medicinal uses" AND (2) "*Syzygium cumini*" OR "solvent polarity." 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 potential of jamblang in medicinal uses based on solvent polarity, the control group only received liquid without therapeutic effect or no treatment, studies were conducted in a timeframe from 2013-2023, and the main outcome was the potential of jamblang in medicinal uses based on solvent polarity. Meanwhile, the exclusion criteria were animal models that were not related to medicinal uses, 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.

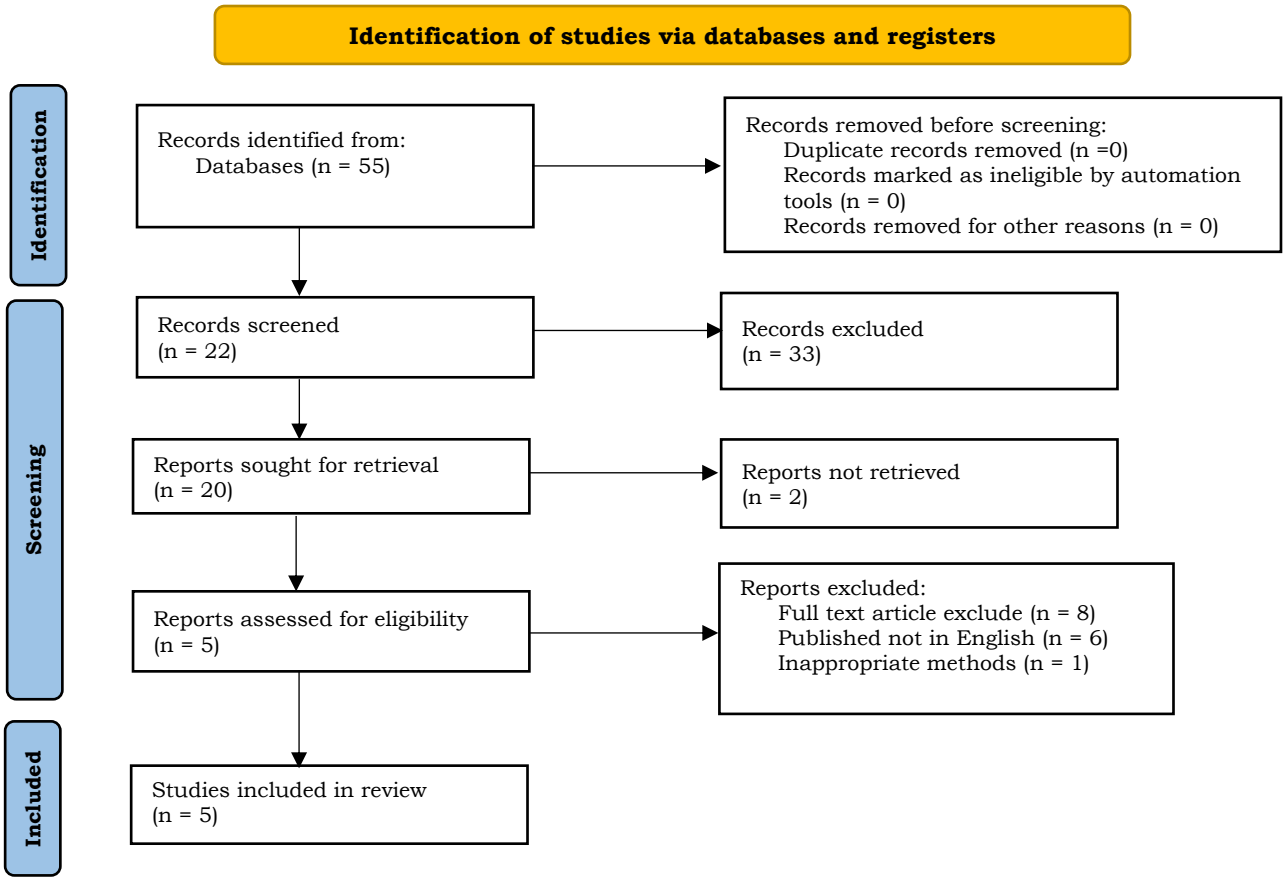

Figure 1. Research PRISMA diagram.

3. Results and Discussion

The potential of the polar solvent of *Syzygium cumini*

The principle of solvent extraction is based on the rule of "like dissolves like". This means that polar compounds will dissolve in polar solvents, and non-polar compounds will dissolve in non-polar solvents. Flavonoids and anthocyanins are both polar compounds, so they will dissolve in polar solvents such as water and ethanol. Water is the most polar solvent, and it is often used as a solvent for extracting flavonoids and anthocyanins. However, water can also extract other compounds from plant material, such as proteins and carbohydrates. Ethanol is a less polar solvent than water, but it is still polar enough to extract flavonoids and anthocyanins. Ethanol is also less likely to extract other compounds from plant material, so it is often preferred over water for extracting flavonoids and anthocyanins. In addition to water and ethanol, other polar solvents that can be used for extracting flavonoids and anthocyanins include methanol, acetone, and ethyl acetate. The choice of solvent will depend on the specific plant material being extracted and the desired properties of the extract.[8,9]

Flavonoids can help protect cells from damage caused by free radicals. Free radicals are unstable molecules that can damage DNA, proteins, and other cellular components. Antioxidants can help neutralize free radicals, reducing the risk of chronic diseases such as cancer, heart disease, and stroke. Flavonoids can help reduce inflammation, which is a contributing factor to many diseases. Inflammation can also lead to pain and discomfort. Flavonoids can help fight against bacteria, viruses, and fungi. This can help to prevent infections and improve overall health. Flavonoids have also been shown to have potential benefits for brain health, vision, and blood sugar control.[10,11]

The potential of the non-polar solvent of *Syzygium cumini*

Terpenes and steroids are both non-polar compounds, so they will dissolve in non-polar solvents such as acetone and methanol. Acetone is a colorless, volatile liquid that is often used as a solvent in industry. It is also a common solvent for extracting non-polar compounds from plant material. Methanol is a colorless, flammable liquid that is also a common solvent for extracting non-polar compounds from plant material. In addition to acetone and methanol, other non-polar solvents that can be used for extracting terpenes and steroids include hexane, petroleum ether, and dichloromethane. The choice of solvent will depend on the specific plant material being extracted and the desired properties of the extract.[12-15]

Terpenes are a large and diverse group of organic compounds that are found in plants. They are responsible for the characteristic smell and taste of many plants, and they also have a number of potential medicinal properties. Terpenes can help protect cells from damage caused by free radicals. Free radicals are unstable molecules that can damage DNA, proteins, and other cellular components. Antioxidants can help neutralize free radicals, reducing the risk of chronic diseases such as cancer, heart disease, and stroke. Terpenes can help reduce inflammation, which is a contributing factor to many diseases. Inflammation can also lead to pain and discomfort. Terpenes can help fight against bacteria, viruses, and fungi. This can help to prevent infections and improve overall health. Terpenes have been shown to have potential anti-cancer activity. They can help to inhibit the growth and spread of cancer cells. Terpenes have also been shown to have potential benefits for brain health.[16-18]

Steroids are a class of organic compounds that are essential for many bodily functions. They are found in both plants and animals. The steroids in jamblang are thought to be responsible for some of its medicinal properties. One of the most well-studied effects of steroids in jamblang is their antidiabetic effect. Studies have shown that extracts of jamblang seeds can help to lower blood sugar levels in people with diabetes. This is thought to be due to the presence of a steroid called jamboline, which has been shown to inhibit the production of glucose in the liver. Jamblang

steroids have also been shown to have anti-inflammatory, antioxidant, and antimicrobial properties. These properties may be responsible for some of the other medicinal uses of jamblang, such as its ability to treat diarrhea, ulcers, and infections. However, more research is needed to fully understand the effects of steroids in jamblang and their potential medicinal benefits.[19]

Jamblang extracts have been shown to lower blood sugar levels in people with diabetes. This is thought to be due to the presence of the steroid jamboline, which inhibits the production of glucose in the liver. Jamblang extracts have anti-inflammatory properties. This may be due to the presence of steroids such as gomphotherin and jambosine. Jamblang extracts are rich in antioxidants. These antioxidants can help to protect the body against damage from free radicals. Jamblang extracts have antimicrobial properties. This may be due to the presence of steroids such as jamboline and gomphotherin.

Jamblang extracts can help to treat diarrhea. This is thought to be due to the presence of the steroid jambosine, which has astringent properties. Jamblang extracts can help to treat ulcers. This is thought to be due to the presence of the steroid jambosine, which has anti-inflammatory and antimicrobial properties. Jamblang extracts can help to treat infections. This is thought to be due to the presence of the steroids jamboline and gomphotherin, which have antimicrobial properties.[20]

4. Conclusion

The solvent plays an important role in the extraction of compounds from *Syzygium cumini*. The solvent must be able to dissolve the target compounds, but it must not also dissolve other compounds that are not desired. The solvent must also be compatible with the plant material and the extraction method. The solvent must be of the same polarity as the target compounds. For example, polar solvents such as water and ethanol are good for extracting polar compounds, such as flavonoids and anthocyanins. Non-polar solvents such as acetone and methanol are good for extracting non-polar compounds, such as terpenes and steroids.

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