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Literature Study: Chemical Content and Benefits of Bidara Leaves (*Ziziphus Muritiana*) as an Indonesian Herbal

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ABSTRACT

Plants with various varieties can be found in various regions in Indonesia. Many varieties of medicinal plants in Indonesia have been used as raw materials for making medicines and several of these plant types have been clinically evaluated for their phytochemical composition, efficacy and safety of use. Bidara leaves, scientifically known as *Zizhipus mauritiana L.*, are often used in Traditional Chinese Medicine to cure a number of diseases, such as urinary problems, digestive disorders, fever, liver complaints, weakness, anemia, obesity, diabetes, bronchitis, skin infections, loss of appetite. eating, pharyngitis, diarrhea, cancer, and insomnia. The reference literature obtained from the search results is then studied and examined to determine research findings, then described using the data or samples collected as is. Based on research and literature studies, bidara leaves have various significant health benefits, especially because of their rich chemical compound content. The flavonoid, tannin, terpenoid, steroid, alkaloid, triterpenoid and saponin compounds in bidara leaves have been proven to have anti-microbial, anti-depressant, anti-inflammatory, anti-oxidant and anti-cancer activity. Furthermore, bidara leaves can also protect body cells such as the kidneys and brain from oxidative stress, which is one of the main risk factors for cancer. Therefore, bidara leaves can be a safe and natural alternative treatment for various diseases and health conditions.

Keywords: Bidara leaves, chemical content, traditional medicine

I. INTRODUCTION

As a country with a high level of biodiversity, Indonesia has very rich natural resources, one of which is plant diversity, especially medicinal plants. There are 30,000 to 7,000 types of plants in Indonesia that have medicinal properties. Several of these plants have been clinically studied for their phytochemical composition, efficacy and safety of use (Akhyar, 2010). One of the plants that has medicinal properties is the Bidara plant. Bidala plant extract (*Ziziphus mauritiana L.*) can be used to treat wound infections, meningitis, and various other wound infections caused by microorganisms (Pabisa, 2020). Research has found that bidala leaves contain, among other things, steroids, alkaloids, triterpenoids, saponins, tannins (Aisyah et al., 2020).

Bidara leaves or scientifically known as *Zizhipus mauritiana L.* are often used as traditional Chinese medicine to treat various diseases such as urinary tract diseases, digestive system diseases, fever, liver disease, weakness, anemia, obesity, diabetes, bronchitis, skin. infection. , loss of appetite, sore throat, diarrhea, cancer and insomnia. This plant grows in the Madura area, especially Sumenepe. The components of bidala leaves include alkaloids, saponins, triterpenoids, flavonoids, proteins and lipids (Putri, 2017).

Study of the chemical composition of the ethanol extract of bidara leaves using the maceration method shows that the extract contains, among other things, alkaloids, flavonoids, phenols, tannins and saponins (Ashri, 2016). Antimicrobial agents are components produced by microorganisms that can inhibit or even kill the life processes of microorganisms at low concentrations. Antimicrobials are included in the antibacterial group and are used to prevent the growth of bacteria in the body. Active chemicals are said to have antimicrobial effects if they are able to inhibit bacteria at low concentrations (Magani et al., 2020).

Analysis of saponins in bidara leaf extract using GCMS as support for FTIR data revealed the presence of saponin compounds with a molecular weight of 873.0 g/mol (Bintoro et al. 2017). The total flavonoid content in the ethanol extract of *Ziziphus spina-christi L.* was 1.5312%, and the IC50 was 90.9584 ppm. This value shows that the ethanol extract of bidara leaves (*Ziziphus spina-christi L.*) has the potential to be a strong antioxidant (Haeria, 2016). Mauritius methanol leaf extract is rich in alkaloids, tannins, flavonoids, phenols and saponins. The antibacterial activity of Mauritius leaf extract in methanol solvent has an inhibition zone of 7.25 mm against *Staphylococcus aureus* , 6.25 mm against *Pseudomonas aeruginosa* , and 8.75 mm against *Proteobacteria vulgaris* , the inhibition zone against *Bacillus cereus bacteria* is 13.00 mm (Haeria , 2018).

II. RESEARCH METHODS

Reference searches were carried out using Google Scholar and the reference libraries included in the selection criteria were:

(a) Holding the research title of the study of bidara leaves
(b) Come from a clear institution and have clear researcher status
(c) Research conducted in Indonesia and other countries
(d) Published in national and international journals
(e) There is a clear year of publication and year of research
(f) Conduct discussions and provide clear references
(g) Have research methods
(h) Have a clear bibliography

The references obtained from the search results are then studied and examined to determine the findings, which are then described or summarized using the data or samples collected as they are.

III. RESULTS AND DISCUSSION

From the results of the literature search, 11 articles and scientific papers were obtained (Table 1). From the results of the literature study, researchers found several chemical contents and benefits of bidara leaves as stated in (Table 1).

Table 1. List of Relevant Articles

No	Writer	Chemical Content	Benefit
1.	Bintoro et al (2017)	Saponins	Identify saponins
2.	Chairunnisa et al (2019)	Saponins	Antimicrobial, anti-inflammatory
3.	Ekanursyahfitri (2017)	Flavonoids, saponins and tannins	Antibacterial
4.	Haeria (2016)	Flavonoids	Antioxidant
5.	Jannah (2019)	Alkaloids, saponins, tannins and steroids	Anti cancer
6.	Kamila K (2019)	Flavonoids, saponins and tannins	Antibacterial
7.	Lumbanraja IM (2019)	Saponins	Antimicrobial
8.	Nova (2019)	Alkaloids and flavonoids	Anti depressant
9.	Noviasari RW (2018)	Flavonoids	Anti-oxidant, anti-diabetic
10.	RAZ Princess (2018)	Alkaloids, flavonoids, steroids, tannins and triterpenoids	Anti cancer

11.	Rahmawati Y (2018)	flavonoids, tannins, terpenoids, steroids, alkaloids, and saponins	Anti-oxidant, anti-bacterial, anti-inflammatory

Ingredients of Bidara Leaves

The bidara leaf plant is widely planted in Indonesia and is used to treat various diseases. The leaves come from shrubs or small trees which usually reach 15 meters high and have a curved shape with a stem length of 40 cm. The branches are entwined with short, scattered hairs, often drooping. Referred to as semi-deciduous plants or evergreen plants. Bidara is also called *Ziziphus mauritiana* in Latin. The bidara, a fast-growing, bush-forming, thorny plant, uses birds and mammals to produce fruit and can spread its seeds throughout the region. For a long time, bidara fruit trees have been considered dangerous weeds in several states of South Africa, Australia, and islands in the Indian and Pacific oceans. However, bidara fruit and leaves are used in its native region, Asia, especially in China and India.

Figure 1. *Ziziphus Mauritiana*
***Source** (https://images.app.goo.gl/LWhi9Mt6WKUEEj49A)*

The classification of bidara plants is according to Tjitrosoepomo (2010).

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Rosales
Family : Rhamnaceae
Genus : Ziziphus
Species : Ziziphus Mauritiana

Because of its phenolic content, bidara leaves are useful for suppressing bacterial growth. The phenolic and flavonoid compounds contained in the bidara plant function as antimicrobials (Junaidi, 2021). Bidara leaves are used by people in their native region, India, to cure wrinkles, acne and dark circles under the eyes. Bidara leaves are often used as a medicine for boils in Indonesia, especially in the NTT region. Bidara leaves are mashed or chewed until smooth, then placed on the boil (Junaidi, 2021). With an ethanol concentration of bidara leaves of 0.15%, topical cream preparations that meet physical quality standards for cream can be made. Nanocream innovation is used to maximize the distribution of active substances in cosmetic products. Nanocream is a semisolid emulsion with a droplet diameter of 20-500 nm (Sari, 2021). One of the advantages of using nanocream as a topical formulation is its small size. A study has shown that the smaller the particle size of the extract, the greater its distribution and pharmacological activity. This is because ethanol extract from bidara leaves can have stronger antibacterial properties if the particle size is smaller. As a result, the nanocream preparation is easier to apply and adheres to the skin.

People use bidara as medicine. The bidara plant (*Ziziphus Spina-Christi L.*) contains phenolics and flavonoids, which have anti-inflammatory, antibacterial and antioxidant properties, and function to prevent tumor growth. The bidara plant contains alkaloids, phenols, flavonoids and terpenoids which function as medicine (Tazkiatulmilla, 2020). *Ziziphus Spina-Christi L.* ethanol extract concentrations of 1% w/v, 3% w/v, and 9% w/v have been proven to be able to stop the growth of Candida albicans and Escherichia coli (Krisnawati, 2021). Three ways flavonoids function as antimicrobials: they stop nucleic acid synthesis, stop cell membrane function, and stop energy metabolism (Nomer et al., 2019). Tannins are antibacterial due to their reactivity to cell membranes, enzyme inactivation, and inhibition of the function of genetic material. In terms of antibacterial properties, saponin is able to make cells release proteins and enzymes that should be trapped inside (Nusantari 2015).

Benefits of Bidara Leaves

1. Anti-Microbial

Bidara leaves have the greatest benefit as an antimicrobial that fights fungi, bacteria and parasites. Some of the active compounds in bidara leaf extract include alkaloids, phenols, flavonoids and saponins. They have the potential to function as antimicrobials. In the inhibitory power test, the ethanol extract of bidara leaves showed an inhibitory zone for several bacteria, such as *Streptococcus mutans* , *Salmonella thypi* , *Echerichia coli* , *Pseudomonas aeruginosa* , *Vibrio sp* ., and *Staphylococcus epidermididan* . Saponin, which functions as an anti-bacterial, is the active ingredient in bidara leaves. Due to its polarity, solubility in water (hydrophilicity), and water-soluble properties, saponins are often referred to as natural surfactants. Tannins, alkaloids, and flavonoids are some other chemicals that have anti-microbial properties; Alkaloids are very effective because they can disrupt the petidoglycan part of bacteria, which causes the microbial cell wall layer to be disrupted, so that the cells are easily lysed. Tannins and flavonoids work together to form complex compounds with extra cellular and soluble proteins that can damage microbial cell membranes.

2. Anti-depressant

The alkaloids and flavonoids of bidara leaves can help improve the central nervous system and reduce symptoms of depression because they stop the enzyme monoamine-oxidase, which breaks down catecholamines and serotonin, among other central nervous system neurotransmitters.

3. Anti-inflammatory

Its antipyretic and analgesic properties are caused by the flavonoid content of bidara leaves which inhibit inflammatory factors in two mechanisms. Inhibition of cyclooxygenase results in the formation of prostaglandins, a type of mediator of pain and fever. Inhibition of neutrophil degranulation also inhibits the release of cytokines, which play a role in the inflammatory process.

4. Anti-oxidant

According to Haeria (2018), the concentration of flavonoids in bidara leaf extract is responsible for its strong antioxidant properties. Flavonoids and other reducing agents have the ability to stop many oxidation events by donating electrons to free radicals. This stabilizes free radicals and prevents oxidation reactions from occurring.

5. Anti-Cancer

In research conducted on the nhexane and ethanol fractions of bidara leaves, it was

found that alkaloid, saponin, triterpenoid and steroid compounds have cytotoxic properties as anticancer. In addition, these compounds produce a reducing compound called quercetin. Quercetin, which is known as an antioxidant, interacts with the proto-oncogene receptor proteintyrosine kinase and uridine 5-monophosphate synthase as an anticancer drug receptor that can stop cancer cell DNA topoisomerase.

IV. CONCLUSION

Based on research and literature studies, bidara leaves have various significant health benefits, especially because of their rich chemical compound content. The flavonoid, tannin, terpenoid, steroid, alkaloid, triterpenoid and saponin compounds in bidara leaves have been proven to have anti-microbial, anti-depressant, anti-inflammatory, anti-oxidant and anti-cancer activity. Furthermore, bidara leaves can also protect body cells such as the kidneys and brain from oxidative stress, which is one of the main risk factors for cancer.

Therefore, bidara leaves can be a safe and natural alternative treatment for various diseases and health conditions. Further research is needed to confirm the health benefits of bidara leaves and to determine the optimal dosage and method of use.

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