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Identification And Phytochemical Testing Of Traditional Medicinal Plants Of The North Buton Community

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Abstract

Medicinal plants play a very vital role in their use for medicine, in addition to providing ecological, economic and cultural benefits. Since ancient times, plants have been used as a source of effective and safe medicines. Plants can have medicinal properties because they contain secondary metabolites or other bioactive compounds. This study uses samples of medicinal plants that have been used by the people of North Buton as traditional medicine for hundreds of years. This plant has never been reported in previous studies. This study aims to determine the types of medicinal plants and the phytochemical content contained in these plants. The research was conducted with several stages of identification and phytochemical testing. The phytochemicals analyzed included flavonoid alkaloids, tannins, steroids, terpenoids, saponins and phenols. Phytochemical tests were carried out on plant organs, namely roots, stems and leaves. The results of plant identification showed that the plant was a genus of *Embelia*. Furthermore, the results of phytochemical tests showed that the roots and stems of *Embelia* sp. contains flavonoids, alkaloids, steroids, saponins, tannins and phenols. Furthermore, the leaves of *Embelia* sp. contains alkaloids, steroids, saponins, tannins and phenols.
Keywords : Plant Identification, Phytochemical Testing, Traditional Medicinal

Introduction

Plants and natural products of plant origin have a long history in traditional medicine around the world (Stephane and Jules, 2020). Medicinal plants play a very vital role in their use for medicine, in addition to providing ecological, economic and cultural benefits. Since ancient times, plants have been used as a source of effective and safe medicines. The world's main way of treating disease and fighting infection is based on the use of medicinal plants. Globally around 64% of the world's total population depend on traditional medicine for their health needs (Phondani et al., 2016). Medicinal plants are known as potential sources of important therapeutic or curative aids. The use of medicinal plants has played an important role in health systems around the world. The use of medicinal plants is not only for the treatment of diseases but also has the potential to maintain better health. Most countries in the world or two thirds of the world's population depend on herbal medicines from plants for primary health care. The main reasons are cultural acceptability, compatibility, better adaptability to the human body and lower side effects (Oladeji, 2016).

The term "medicinal plants" includes various types of plants used as herbal medicines. Previously medicinal plants only used woody plants, now they have used various plant parts such

as roots, leaf stems, fruits, seeds, flowers, stigmas and non-woody plants. Plants have been used for medicinal purposes long before prehistoric times. Ancient Unani manuscripts Egyptian papyrus and Chinese writings described the use of herbs. There is evidence that Unani Hakims, Indian Vaids and European cultures used herbs for more than 4000 years as medicine. Plants can be used as a treatment because of the content of secondary metabolites in plants.

Secondary metabolites are intermediates or products of metabolism, the term metabolite is usually limited to small molecules. Metabolites have various functions such as fuel, signaling, stimulatory and inhibitory effects on enzymes (usually can act as cofactors). Plants produce various kinds of organic compounds and most of them do not play a direct role in growth and development. These compounds are traditionally referred to as secondary metabolites. Unlike primary metabolites, the absence of secondary metabolites does not result in immediate death, but rather long-term damage to the survival of the organism. Secondary metabolites are active compounds synthesized from primary metabolites. The quality and quantity of secondary metabolites are different for each type of plant that grows in different locations (Jain; et al., 2019). This study aims to identify the type and content of secondary metabolites of medicinal plants used by the people of North Buton since hundreds of years ago. This plant by the people of North Buton is used to treat fever and as a febrifuge.

MATERIALS AND METHODS

Plant Identification

Identification of plants in this study through several processes including:

1. Making Herbarium Specimens: Plants are taken from their natural habitat, then preserved using alcohol. Recording the morphological and biological properties and characters of plants which include morphological characteristics (color, smell, etc.), habit, location, habitat, ecological data, benefits and others.
2. Key to Determination: determination is done by reducing the scope of the identified plant group. These plants are grouped based on morphological characteristics.
3. Comparing Specimens: plants are then compared with other plant specimens which can be a herbarium. Comparisons are also made using reference books.
4. Writing Plant Descriptions: Plants described using a reference book are written in a notebook. Records are kept to serve as supporting reports.
5. Expert Opinion: The last step is to ask for expert opinion who is competent in the field of plants. The results obtained are recorded and documented as results.

Phytochemical Test

Phytochemical tests in this study were carried out on each plant organ (roots, stems and leaves) using three types of solvents. The solvents include alcohol, ethyl acetate and hexane. Phytochemical test stages through several stages including:

Extraction

Extraction was carried out on each plant organ consisting of roots, stems and leaves. Organs from both types of plants are dried and crushed. A total of 100 grams of plant organ powder was put into a beaker, then 600 mL of hexane and ethyl acetate were added, then incubated for 3 days. The next step was filtered using filter paper, the filtrate obtained was stored and the residue was macerated again with 600 mL of hexane and ethyl acetate each, then incubated for 3 days. The

maceration process was carried out until a colorless maserate was obtained. The obtained filtrate is combined, then the solvent is evaporated using a rotary evaporator

Flavonoid Test

The flavonoid test was carried out on each plant organ by means of 1 mL of sample mixed with 1 mL of 70% ethanol. Next, 0.1 g of Mg powder and 10 drops of concentrated HCL were added and homogenized using a vortex. A positive test for flavonoids is indicated by a red, yellow and orange color change.

Alkaloid Test

The alkaloid test was carried out on each plant organ by mixing 10 mL of the sample with 1.5 mL of 2N HCL. Then heated for 5 minutes and then filtered using filter paper. The filter results were added 5 drops of Dragendorff's reagent, the positive test results for alkaloids were indicated by an orange or orange color.

Steroid and terpenoid test

The terpenoid test was carried out individually on plant organs (by mixing 1 mL of the sample with 5 drops of acetic acid alhydrate and then homogenized using a vortex. Then added with 2 drops of concentrated H_2SO_4. The formation of a blue green color in the sample indicates the presence of steroid content and the formation of a red color indicates the presence of terpenoids.

Saponin Test

Saponin test was carried out individually on plant organs (roots, stems and leaves) by dissolving 1 mL of sample with 1 mL of distilled water, then stirring for 15 minutes. A positive result of saponin content was indicated by the presence of a stable foam for 5 minutes.

Tannin Test

The tannin test was carried out on each plant organ by dissolving 1 mL of the sample with 2 mL of distilled water. Then 3 drops of FeCl3 solution were added. Formation of blue-black or green-black color indicates a positive tannin content.

Phenol Test

The phenol content test was carried out on each plant organ by mixing 3 mL of the sample with 3 drops of 1% $FeCl_3$. Formation of green, red, purple, blue or black color indicates the presence of phenol in the sample.

Data analysis

Data analysis in this study is a qualitative descriptive analysis. The plant identification data was described qualitatively. Furthermore, the data from the plant phytochemical test is marked with the symbol (+) to indicate that the extract contains secondary metabolites and the symbol (-) to indicate that the plant extract does not contain secondary metabolites.

Results and Discussion

Plant Identification

The plants identified in this study have not been reported in any studies. Identification can only be done up to the genus level which is validated by the Indonesian Institute of Sciences. These plants were obtained from the forest area of North Buton. The plant belongs to the liana group, the stem of the plant produces water that can be consumed as medicine. leaves and stems of plants as shown in Figure 1

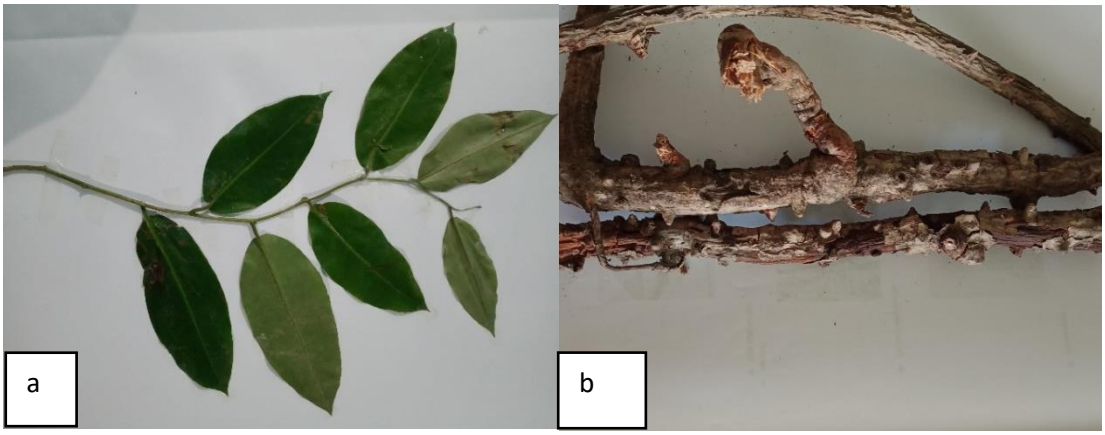

Figure 1. a) plant leaves.; b) Plant stem

The results of plant identification indicate that the plants analyzed in this study are of the genus *Embelia* from the Primulaceae family. The genus Embelia is a tropical genus that has a lot of diversity. Plants belonging to this genus have very strong medicinal properties. One of the main medicinal bioactives of this genus is known as embelin (Vijayan and Raghu, 2021). The genus Embelia has a variety of species such as *Embelia ribes* Burn. fil., *Embelia clusiifolia* Miq. *Embelia tropophylla* H. perrier, *Embelia furculosa* B.C. Stone, *Embelia rigida* Mez, *Embelia macrocarpa* King & Gamble, *Embelia gracilenta* S. Moore. etc. Three new species of the genus Embelia have been identified from peninsular Malaysia and Singapore including *Embelia butangifolia*, *Embelia intricata* and *Embelia vinosiramosa* (Dubéarnès et al., 2015). Species under the genus Embelia have long been used in traditional medicine practices. In North Buton *Embelia* sp. more commonly used for fever and allergy medications.

The genus Embelia has been the focus of researchers in the pharmaceutical field because a number of medicinal properties have been noted. Species under this genus have been widely used in traditional medicinal practices. Species under this genus have various biological activities such as anthelmintic, carminative, antibacterial, antibiotic, and hypoglycemic binding (Vijayan and Raghu, 2021). A new study reports that the potential of drugs from the genus Embelia has various properties, especially as hepatoprotective, analgesic, amylase inhibition, trypsin inhibition, antibacterial, anticonvulsant, adaptogenic, antifertility, anticancer, antihyperlipidemic, antifungal (Souravi and Rajasekharan, 2014).

Phytochemical analysis

Phytochemical tests were carried out on each plant organ which included roots, stems and leaves. The phytochemicals tested included flavonoids, alkaloids, steroids, terpenoids, saponins, tannins and phenols. The results of phytochemical tests on plant extracts are listed in Table 1.

Solvent	Chemical Compound	Organ tanaman		
		Root	Stem	Leaf
ethyl acetate	Flavonoids	+	+	-
	Alkaloids	+	+	+
	Steroids	+	+	+
	terpenoids	-	-	-
	Saponins	+	+	+
	Tannins	+	+	+
	Phenol	+	+	+
hexane	Flavonoids	+	+	-
	Alkaloids	+	+	+
	Steroids	+	+	+
	terpenoids	-	-	-
	Saponins	+	+	+
	Tannins	+	+	+
	Phenol	+	+	+

Flavonoid Test

The results in Table 1 show that the roots and stems of Embelia sp. indicates the presence of flavonoids. The content of flavonoids is indicated by a change in the color of the solution to red. However, the leaves did not show any flavonoid content. It is characterized by the absence of color change. Plants from the genus Embelia contain phenols and flavonoids that have free radical scavenging properties (Alam et al., 2019). Flavonoids are polyphenolic compounds which are divided into 6 groups: isoflavonoids, flavonones, flavonols, flavones, flavanols and anthocyanidins which are found in various types of plants. Flavonoids have been shown to have a wide range of anticancer effects. Flavonoids work by stopping the cell cycle, inducing apoptosis, autophagy, and suppressing the proliferation and invasion of cancer cells (Kopustinskiene et al., 2020).

Alkaloid Test

The results of the analysis showed that Embelia sp. contains alkaloids, both in roots, stems and leaves. *Embelia* sp. contains several types of secondary metabolites such as alkaloids, saponins and tannins (Supriningrum et al., 2021). Alkaloids are a class of organic compounds found in the plant kingdom. Alkaloids are used as valuable medicinal agents which can be utilized to treat various diseases such as malaria, diabetes, cancer, heart dysfunction etc. In plants themselves,

alkaloids are mainly involved in plant defense against herbivores and pathogens. Medicinal plants are rich sources of alkaloids, which have antiplatelet and anticoagulant activity (Ain et al., 2016). Alkaloids can be used as treatments such as anti-inflammatory, antimicrobial, antifungal, analgesic, pain relief, neuropharmacology, and many other activities (Kurek, 2019).

Steroid Test

The results of the analysis showed that the roots, stems and leaves of Embelias sp. in this study contained steroids. This is indicated by a change in the color of the solution to a bluish green. *Embelia ribes* Burn. F. contains a variety of secondary metabolites such as alkaloids, glycosides, flavonoids, phenolics, sterols, steroids, triterpenoids, saponins and tannins (Saraf et al., 2016). Embelia ribes fruit extract contains volatile oil compounds, rennins, flavonoids, saponins, steroids, alkaloids, steroidal sapogennins, quinones, and CHO (Asadulla et al., 2020). Embelia ribes Burn. F. is one of the species of the genus Embelia that has been widely reported by researchers.

Terpenoid Test

The results of the analysis showed that Embelia sp. In this study, no terpenoids were identified. Terpenoids are the largest class of natural products that are widely used in the industrial sector such as flavorings, fragrances, spices and are used as ingredients for making cosmetics (Singh and Sharma, 2015; Jiang, et al., 2016). Several terpenoids have been used in the pharmaceutical field such as artemisinin and taxol as malaria and cancer drugs. Terpenoids are found in most plants that can be used as herbal medicine and also for diet. However, this study did not find any terpenoid content in plants.

Saponnin Test

The results of the saponin test on Embelia sp. showed that there was saponin content in root and stem organs. Furthermore, the plant leaves did not show the presence of saponins. Most species of the genus Embelia are reported to contain alkaloids, saponins and tannins (Supriningrum et al., 2021). Saponins are one of the most diverse group of natural plant products. Saponins have various ecological roles including plant defense against diseases and herbivores. Some saponins have strong biological activity, so they can be used as basic ingredients for medicines (Mugford and Osbourn, 2013). Saponins are traditionally used as natural detergents, the name 'saponin' comes from the Latin 'sapo' which means 'soap' (Kregiel et al., 2017).

Tannin test

The results of the analysis showed that the roots, stems and leaves of the plant contain tannin. Tannins are found in most plant species, they function to protect plants from predation and regulate plant growth (Das et al., 2020). Tannins can be used in the pharmaceutical field as anti-inflammatory, cicatrizant and anti-HIV (Furlan et al., 2011). Most species of the genus Embelia contain phenolic tannins, alkaloids, and flavonoids that can be used as traditional medicine whereas terpenoids, glycoside, and phytosterols were absent (Pandey and Ojha, 2011; Guyasa et al., 2018)

Phenol Test

The roots, stems and leaves of the genus Embelia in this study showed the presence of phenol content. Phenols are compounds that have one or more aromatic rings with one or more hydroxyl

groups. It is widely distributed in plants and is the most abundant plant secondary metabolite, with more than 8,000 phenolic structures currently known (Dai and Mumper, 2010). Embelia stem and leaf extracts are reported to contain flavonoids and phenols. These compounds can be used as a source of medicines because they have antioxidant activity (Kamble and Gaikwad, 2019)

Conclusion

Based on the results of the study, it can be concluded that the community's traditional medicinal plants are of the genus Embelia. The plant cannot be identified at the species level. Plants contain various types of secondary metabolites such as flavonoids, alkaloids, steroids, saponins, tannins and phenols.

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