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IDENTIFICATION OF PHYTOL COMPOUNDS IN PANGI LEAVES ETHANOL EXTRACT (Pangium edule Reinw. Ex Blume) USING CHROMATOGRAPHY-MASS SPECTROSCOPY (GC-MS) GAS METHOD

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ABSTRACT

Background: Plants play an important role in the environment by supporting all types Background: Pangi (*Pangium edule Reinw. Ex Blume*) thrives in most parts of Southeast Asia, including Indonesia. The pangi plant is a versatile plant where almost all parts of this plant have benefits. Research Objectives: To identify phytol compounds in the ethanol extract of pangi leaves (*Pangium edule Reinw. Ex Blume*) using the Gas Chromatography-Mass Spectroscopy (GC-MS) method.

Type of Research: This type of research is experimental research with a laboratory scale. Based on the results of the GC-MS analysis that has been carried out, it can be concluded that the ethanol extract of pangi leaves (*Pangium edule Reinw. Ex Blume*) contains a group of chemical compounds Phytol with a content of 10.33%. Pangi shows an effective antifungal activity; as an antioxidant and antibacterial.

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INTRODUCTION

Herbal medicine is a type of medicine derived from plants. In developing countries, most of them still use herbal medicine to meet their health needs, according to the World Health Organization (WHO), the United States 42% of the population uses herbal medicine, 40% UK, 70% Canada, 49% France. Likewise, the use of herbal medicines in Asia where Indonesia uses herbal medicines 70%. [1]

Pangi plant (*Pangium edule* Reinw. Ex Blume) or also known as a fruit-producing plasma germ plant that can be consumed and has potential as medicine and herbs. Pangi is used as a snack food, cooking spice, food preservative and antiseptic medicine. Pangi can be classified as a type of multipurpose tree because almost all parts of this plant can be used

Manuhutu (2011) states that the pangi plant (*Pangium edu*le Reinw. Ex Blume) can be used as traditional medicine, the leaves are vegetables, the flesh can be eaten when it is ripe, and the seeds are processed as cooking spices, and can also be eaten as snacks. This pangi seed meat contains antioxidant compounds that function as anti-cancer, including vitamin C, iron ions and β-carotene and flavonoid class compounds that function as antibacterials including cyanide acid, hydrocarbon acid, khaulmograt acid, gorlat acid and tannins. [3]

Pangi leaves (Pangium edule Reinw. Ex Blume) are classified as non-commercial plants and are only made or used as vegetables, oil produced from pangi leaf fruit that can be consumed by local people. From the information revealed successively, it is known that in addition to being used or consumed as food for the surrounding community, it can also eliminate cholesterol. [2]

Arini (2011) states that pangi leaves (Pangium edule Reinw. Ex Blume) have properties as a pinworm medicine and an antidote for food poisoning. Fresh leaves, leaf sap, crushed leaves and seeds are used as an antiseptic and disinfectant to clean external wounds. In Papua New Guinea, the juice of the fruit is used to treat wounds. Pangi fruit pulp contains antioxidant compounds that function as anti-cancer. [4]

Mora (2014) also states that the Pangi plant is a plant that is widely used to treat itching of the skin which is caused by bacteria found on the skin. The part of the plant that is often used is the leaf. Boiled Pangi leaves can be used as an antiseptic, pest exterminator and parasite deterrent. Sangi et al., (2008) found that the leaves of the Pangi plant contain several chemical compounds such as alkaloids, flavonoids, saponins, tannins and terpenoids. These chemical compounds are thought to have antibacterial properties. [7]

Based on the observation of photo cells, it was reported that pangi leaves had a high inhibition of 94.8% in completely stopping the growth of the HIV virus with a concentration of 400-800 ppm when compared to the drug Lamivudine and one of the compounds that plays a role in inhibiting the growth of the HIV virus is a Phytol compound (10 , 33%). [8]

Phytol compounds are a triterpenoid group which is thought to have antibacterial activity. This is in accordance with the statement of Bhattacharya (2013) that phytol compounds are a class of diterpenoid and triterpenoid compounds. [5]

Phytol compounds are components of chlorophyll, a green pigment in plant tissues and have strong anticancer activity and immune-enhancing effects. It is known that these substances not only increase the activity of natural killer cells and eliminate cancer cells but also increase immunity through the function of macrophages. Phytol has been shown to inhibit cellular aging from H2O2-induced oxidative stress. These results suggest the possible use of phytol as a base ingredient for cosmetics.[6]

Based on the above background, the researchers are interested in conducting research on the identification of phytol compounds in the ethanol extract of pangi leaves (pangium edule reinw. Ex blume) using the Gas Chromatography-Mass Spectroscopy (GC-MS) method.

Types of research

This type of research is experimental research with a laboratory scale.

Population and Sample

1) Population

Population is the whole object of research. The population in this study was pangi leaves (Pangium edule Reinw. Ex Blume) which were taken from Kakarabe Village, South Tobelo District.

2) Samples

The sample used in the study was 500 g of pangi leaf simplicia powder (Pangium edule Reinw. Ex Blume).

Figure . Pangi Leaves

Work Procedures

1) Sample Preparation

1000 g of fresh pangi leaf samples were taken, then washed with running water until they were clean of dirt or other foreign materials. Before it is made into simplicia powder, the clean sample is dried by aerating. The dried sample was mashed and sieved with a size of 80 mesh. The simplicia obtained is wrapped in plastic and stored for further testing.

2) Preparation of Pangi Leaf Ethanol Extract

Extraction of pangi leaf samples (Pangium edule Reinw. Ex Blume) used the maceration method. The extraction process in this study used 70% ethanol as a solvent. A total of 500 grams of pangi leaf simplicia were soaked in 70% ethanol until all simplicia was wetted and ethanol added again until the solvent limit was approximately 2 cm above the simplicia. The maceration container is closed and stored for 5 × 24 hours in a protected place from the sun, stirring occasionally. Then filtered, separated between the pulp and the filtrate. After that, remaceration was carried out with the same type and amount of solvent for 3 × 24 hours. After that, macerate I and II were collected and concentrated using a rotary evaporator at 60 ° C until a total sample of pangi leaf ethanol extract was obtained in the form of a paste. The extract yield was calculated by dividing the extract weight by the dry sample weight. The concentrated extract was weighed and the yield of the sample was obtained. Extract yield expressed in percent and calculated using the equation.

$$\text{Rendement } (\%) = \frac{\textit{Extract weight obtained (grams)}}{\textit{the extracted simplicia weight}} \times 100\%$$

3) Identification of Phytol Compounds

a) Fractionation

The ethanol extract of pangi leaves (Pangium edule Reinw. Ex Blume) was separated by column chromatography using silica gel.60 GF254. The process of separating the compounds is carried out with a gradient elution system using ethanol and n-hexane solvents, meaning that the polarity of the eluent used to elute the sample is increased gradually to produce various fractions. The results of the separation are then accommodated in a numbered vial. After that it is calculated and combined based on the value of the Retardation factor (Rf) and purified to obtain a purer compound.

b) GC-MS (Gas Chromatography Mass Spectrophotometry)

The structure of the compounds from the fraction was determined by using a GS-MS spectrometer. The analysis was performed using GC-MS Agilent 6890 N

2006 with 5 MS DB column dimensions of 30m x 250µm x 0.25µm. System conditions are oven temperature 310oC, detector 310oC, injector 305oC, program temperature (initial 50oC, increase of 3.50oC per minute to maximum temperature 310oC), analysis time 100 minutes, column pressure 14.12 psi with a flow rate of 1.7 mL per minute and injection volume of 2 µL. Analysis using GC-MS to determine the chemical components of plants that have not been obtained. GC-MS has often been used to determine the various components of chemical compounds.

RESULTS

1. Sample Preparation

The collection of raw materials for Pangi leaves is taken from Kakarabe Village, South Tobelo District. 1000 g of fresh samples of pangi leaves were taken. then washed with running water until it is clean of dirt or other foreign materials, then the pangi leaves are chopped into small pieces and then dried by aerating. The dried sample was mashed using a grinding machine and sieved with a size of 80 mesh. The simplicia of pangi leaf powder obtained is weighed as much as 500 grams. The simplicia is then wrapped in plastic and stored for further testing.

2. Preparation of Pangi Leaf Ethanol Extract (Pangium edule Reinw)

Simplicia 500 grams of pangi powder is macerated using ethanol solvent with a ratio of 1: 2 (1 gram of sample in 20 ml of ethanol) for 5 days, then the methanol extract of pangi leaves is filtered, the filtrate is taken and the residue is removed. Maceration again for 2 days (remaseration), then aerated until pangi leaf extract is obtained. The pangi leaf extract obtained is black as much as 28 grams.

3. Organoleptic Examination

Organoleptic examination of Pangi Leaf (Pangium edule Reinw) simplicia in table 1.

Table 1.Organoleptic simplicia of Pangi Leaf (Pangium edule Reinw)

No.	Pangi Leaf	Information
1.	Shape	Fingers
2.	Color	Dark green
3.	Smell	Typical
4.	Taste	Concentrated

Source: Primary Data, 2020

4. Extract yield calculation

$$\text{Rendement } (\%) = \frac{\textit{Extract weight obtained (grams)}}{\textit{the extracted simplicia weight}} \times 100\%$$

$$\%\ \text{Rendement} = \frac{28\ \text{gram}}{500\ \text{gram}} = 100\ \%$$

$$\text{Rendement} = 5{,}6\ \%$$

5. Identification of Pangi Leaf Phytol Compounds (Pangium edule Reinw)

The following is the identification result of the 70% ethanol extract chemical compound of Pangi Leaf Phytol Compound (Pangium edule Reinw as in table 2 .

Type / Sample Code	Name of Compound	Content (%)
Halmahera Red Fruit	3R-acetamido-IC, 6C-bis(acctoxy)5T-dimethyl lamino-cyclohexene	1.03
	Neophytadine	5,21
	(+)-2-endo,3-endo-dimethylbornane	1,24
	Neophytadiene	1,94
	Hexadecanoic acid	15,08
	Hexadecanoic acid	2,06
	Phytol	10,33
	3,5-dimethyl-1-dimethyldodecylsilyloxybenzene	1,62
	Squalene	21,22
	Vitamin E	1,84
	Anisole, m-(2-nitrovinyl)	4,07
	2-(1-methyl-1,5,6,7-tetrahydrobenzopyrazol-3-yl)-6-(2-methyl-4,5,6,7-tetrahyrdobenzopyrazol-3-ylpyridine	2,59
	Spinasterone	1,23

Source: Primary Data, 2020

DISCUSSION

Based on the results of laboratory examinations of Pangi Leaf extract samples presented in table 2, GC-MS chromatogram data shows that Pangi Leaf extract contains Phytol compounds in the percent area, namely 10.33%.

Analysis using the Gas Chromatography-Mass Spectrophotometry (GC-MS) method is a key in the analysis of unknown plant chemical components. Analysis by GC-MS has been widely used in identifying hundreds of components of compounds present in plant cells that cannot be done by ordinary phytochemical screening. This is because phytochemical screening is limited to the identification of compound groups.

Based on previous research from Mapanawang Arend L that Phytol compounds have benefits as antiviral RNA and DNA.

CONCLUSION

Based on the results of the GC-MS analysis that has been carried out, it can be concluded that the ethanol extract of pangi leaves (Pangium edule Reinw. Ex Blume) contains a group of Phytol chemical compounds with a content of 10.33%.

SUGGESTIONS

The suggestion in this study is that further research is needed to determine the pharmacological effects and toxicity tests on experimental animals

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