



Review Article: Phytochemical And Pharmacological Study Of Teapot Grass (*Cyperus Rotundus L*) As A Medicinal Plant

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ABSTRACT

This research is a literature study. The purpose of this study is to determine the chemical content contained in teki grass and its medicinal potential, increase the use of teki grass as a traditional medicine by conducting more systematic and scientific research, and find alternative traditional medicines that are effective and safe for various diseases. This research was prepared using the literature study method. The data collection process was carried out with a literature study on relevant articles and related to the phytochemical study of teki grass plants and the development of its parts that can be utilized. The journal review process involved analyzing relevant articles, with a focus on empirical research conducted within the last 10 years. The search for articles and some data was conducted using Google Scholar and Chat Gpt academic data. Previous phytochemical studies on teki grass tubers revealed the presence of alkaloids, flavonoids, tannins, starch, glycosides and furochromones, and sesquiterpenoids. In the phytochemical test, it was found that teki grass contained alkaloids, saponins, flavonoids, tannins, essential oils and sesquiterpenoids. These compounds are found in parts of the teki grass plant such as leaves, and tubers. Teapot grass plants also have pharmacological activities as wound healing, anti-inflammatory, antimicrobial, antibacterial, antioxidant and analgesic activities.

Keywords: Phytochemical, Pharmacological, *Cyperus rotundus L*

I. INTRODUCTION

Indonesia as a tropical country, has abundant biodiversity, allowing various types of plants to thrive and provide benefits for public health. Natural resources that have potential as medicinal materials in Indonesia are national assets that need to be continuously explored, researched, developed, and optimized. One of the plants that can be utilized as traditional medicine is teki grass (*Cyperus rotundus L*). *Cyperus rotundus L* (teki grass tuber) is a chronic herb that grows wild and receives less attention, even though this plant part, especially the tuber, can be used as an analgesic. The outside of the tuber is brown and the inside is white, smells like spices, tastes slightly bitter.

Teapot grass tubers have pharmacological and biological properties, namely antiCandida, anti-inflammatory, antidiabetic, antidiarrhoeal, cytoprotective, antimutagenic, antimicrobial, antibacterial, antioxidant, cytotoxic and apoptotic, and antipyretic analgesics have been reported for this plant. Previous phytochemical studies on teki grass tubers revealed the presence of alkaloids, flavonoids, tannins, starch, glycosides and furochromones, and sesquiterpenoids. However, not many people have utilized it due to gaps in scientific information

and evidence of its benefits and medicinal activities (Pandey et al., 2013). Therefore, it is necessary to conduct further research to understand the potential of teki grass as a medicinal plant.

The gap in research on the chemical content and medicinal activity of teki grass is still limited and not yet optimal. The use of teki grass as a traditional medicine still depends on the experience and knowledge of the community, so more systematic and scientific research needs to be done. Effective and safe alternatives to traditional medicine are still limited, so research needs to be done to find better solutions.

The purpose of this study is to determine the chemical content contained in teki grass and its medicinal potential, increase the use of teki grass as a traditional medicine by conducting more systematic and scientific research, and find effective and safe traditional medicine alternatives for various diseases.

Teki grass has been used traditionally as medicine, but there are still gaps in research on its chemical content and medicinal activity. The chemical constituents found in teki grass, such as alkaloids, flavonoids, saponins, and tannins, have been known to have significant biological activities. The medicinal activity of teki grass has been known to have relatively low side effects and can be used as an alternative to traditional medicine. This research can help in the development of effective and safe traditional medicine from teki grass. This research can increase the use of teki grass as a traditional medicine by conducting more systematic and scientific research. This research can also increase public awareness about the potential of teki grass as a medicinal plant and the importance of conducting further research.

II. METHODS

This research was prepared using the literature study method. The data collection process was carried out with a literature study on relevant articles related to the phytochemical study of teapot grass plants and the development of their parts that can be utilized. The journal review process involved analyzing relevant articles, with a focus on empirical research conducted within the last 10 years. The search for articles and some data was conducted using Google Scholar and Chat Gpt academic data.

III. RESULTS AND DISCUSSION

A. Phytochemical Study of Teapot Grass (*Cyperus rotundus* Linn)

Teapot grass (*Cyperus rotundus* Linn) is a weed that contains flavonoid compounds, alkaloids, sesquiterpenoids, tannins, saponins in the tubers and leaves. Vegetable ingredients in teki grass can be used as insect repellent compounds, antifungus, anti-microbial, toxins and become a defense for plants against predatory animals (Rahmayanti, 2016).

a. Flavonoids

Flavonoids are phenolic compounds that provide pigments in plants, working as antioxidants to prevent cancer. Flavonoids cause damage to the outer layer of the cytoplasm of bacterial cells resulting in cell death (Nurjanah et al., 2018). Flavonoids produced include apigenin and glycosides (Alfaridz & Amalia, 2016). Flavonoids in plants provide color, taste in seeds, flowers and fruit and aroma

(Mierziak et al., 2014). In addition, flavonoids act as antibacterial, antioxidant, anti-inflammatory and anti-diabetic (Panche, et al., 2016).

b. Alkaloids

Alkaloid is a compound that has nitrogen atoms and is widely obtained in plant and animal parts (Ningrum et al., 2017). Alkaloids can damage the arrangement of peptidoglycan (murein) in bacterial cells which results in the destruction of the bacterial cell wall layer as a whole resulting in cell death (Kurniawan & Aryana, 2015).

c. Sesquiterpenoids

Sesquiterpenoids are terpenoid compounds produced by three isopren units consisting of acyclic and bicyclic skeletons with a naphthalene basic skeleton. Some compounds work as insect repellents and insecticides, some stimulate plant growth and work as fungicides. These compounds have considerable bioactivity including as antifeedants, antimicrobials, antibiotics, toxins, and plant growth regulators and sweeteners (Rahmayanti, 2016).

d. Tannins

Tannin is a phenol compound that has biological effects such as metal ion chelators, antioxidants, and antibacterial compounds (Suwandi, 2012). Tannin is able to bind to bacterial cell proteins that result in denatured proteins in bacterial cells and cause cell metabolism disorders (Sari & Shofi, 2011).

e. Saponin

Saponin comes from the Latin word “sapo” which means soap, this is due to its soap-like molecular structure and has foaming properties when shaken with water (Addisu & Assefa, 2016). Saponins can inhibit enzyme activity thus disrupting cell metabolism (Madduluri et al., 2013).

f. Essential Oil

Essential oils are produced from roots, stems leaves, flowers, fruits, seeds, seed coats and rhizomes in plants. Essential oils are compounds that are generally liquid and have a pungent and aromatic odor (Ghannadi et al., 2012).

B. Pharmacological Study of Teapot Grass (*Cyperus rotundus* Linn)

Before various studies were conducted on the content of teki grass, it turned out that people had often used teki grass for the treatment of diseases, according to Riemens, Weide and Runia (2008) the use of teki grass (*Cyperus rotundus* Linn) as a medicine, among others:

a. Can treat urinary stones

The benefits of teki grass for health are that it can treat urinary stones. The tubers of this teki grass when boiled and processed properly can help cure urinary stones. Stone urination is a symptom where the urinary tract is blocked by clots and crystallization of feces. This disorder will obstruct the urinary tract.

b. Can improve the menstrual cycle

The leaves of teki grass are also very useful for improving the menstrual cycle or menstruation in women. Many of today's women experience problems with their menstrual

cycle, due to various things, such as stress, unhealthy diet and many other things that can interfere with the menstrual cycle or menstruation.

c. Facilitate bowel movements

Another important benefit of teki grass bulbs is for digestive problems. One of the most commonly experienced digestive problems is difficulty defecating, and bowel movements feel hard and not smooth, and often experience abdominal pain. Teapot grass bulbs can be one of the herbal medicines to treat these conditions.

d. Accelerates the blood clotting process

Another important benefit of teki grass and also teki grass bulbs is that it can speed up the blood clotting process and can also help heal new wounds.

e. Stimulates milk production

For a mother who is breastfeeding, teki grass and also teki grass tubers have very good benefits to help stimulate milk production.

f. Cure various skin diseases

Another very important benefit of this teki grass leaf is that it is able to cure various skin diseases. Skin diseases such as eczema, tinea versicolor, athlete's foot, rashes and various other skin diseases can be cured by utilizing teki grass. Teki grass leaves are cut and compressed to the skin that is experiencing skin disease until it feels cold and do it repeatedly until the skin disease is cured.

g. Treating vaginal discharge

The benefits of teki grass for fertility are also very important for women, because teki grass is able to prevent leucorrhea. Vaginal discharge is one of the problems that worries almost all women and with the presence of teki grass, this vaginal discharge condition can be resolved and can avoid vaginal discharge.

Further research was conducted based on the community's belief in some of the benefits of teki grass (*Cyperus rotundus* Linn), some studies show that teki grass is proven to be used for traditional medicine, as follows:

1) Wound healing activity

The alcoholic extract of the tuberous parts of *Cyperus rotundus* Linn was examined for wound healing activity in ointment form in three types of wound models in rats: excision, incision and lethal wound models, the teff grass extract ointment showed considerable difference in response in all the above wound models comparable to standard nitrofurazone ointment drug in terms of wound closure time and healing (Sivapalan, 2013).

2) Antimicrobial activity

In vitro antimicrobial activity by disc diffusion method was used in the evaluation of antibacterial testing of teki grass extracts using ethanol solvent and using aquadest solvent. The ethanol extract of teki grass when tested was recognized to be active against all bacterial strains, while the extract using aquadest showed no inhibition. In another study, acetone and ethanol extracts showed significant activity as broad-spectrum antibacterials in the disc diffusion method. Antimicrobial activity tests were conducted against human pathogenic bacteria (gram negative and gram positive) and fungi viz. *C.albicans* and *A. Niger* (Sivapalan, 2013).

C. Antibacterial Activity

Compounds that have antibacterial properties are alkaloids, flavonoids, saponins, and tannins. The mechanism of alkaloids as antibacterial agents by inhibiting peptidoglycan components in bacterial cells, causing deformation of the cell wall layer and cell necrosis. While the mechanism of flavonoid and tannin flavonoid compounds as antimicrobial agents that interact with bacterial DNA and allow the dissolution of extra-cellular protein complexes. This interaction will damage the permeability of the bacterial cell wall, microsomes, and lysosomes. The mechanism of saponins as antibacterial agents by reducing the surface tension of the bacterial cell wall and disrupting bacterial cell permeability.

D. Anti-inflammatory Activity

Compounds that can act as anti-inflammatory are flavonoids, tannins, alkaloids, and saponins. Alkaloids themselves have a mechanism of suppressing mast cells and releasing histamine. In the mechanism of saponins, namely, inhibiting pro-inflammatory substances that are released and inhibiting the formation of exudates. In the rhizome of teki grass is known to have triterpenoid compounds. Triterpenoids are obtained by chromatographic separation from petroleum ether extracts. Terpenoids are known to be a very potent anti-inflammatory, as a significant antipyretic and analgesic, similar in effect to acetyl salicylic acid. *Cyperus rotundus* Linn is also reported to be protective in inflammatory bowel disease (Sivapalan, 2013).

On its own flavonoid mechanism as an anti-inflammatory that inhibits arachidonic acid metabolism and secretion of lysosomal enzymes from endothelial cells and neutrophil cells (Isyraqi et al., 2020). Alcohol extract (70% alcohol) has the ability as anti-inflammatory activity against carrageenan-induced edema in white rats. In another study the petroleum ether extract of the rhizome showed anti-inflammatory activity against carrageenan induced edema in albino rats.

E. Aktivitas Antioksidan

Flavonoid compounds are compounds that act as antioxidants. The mechanism of action of flavonoid compounds as antioxidants is by trapping free radicals and preventing the regeneration of free radicals that will damage body tissues. In a study conducted by Hasri (2018), flavonoid test with teki grass tuber samples showed that the ethanol extract of the plant identified flavonoid compounds.

In addition to flavonoid compounds, tannin compounds can also act as antioxidants. The results of phytochemical screening in the tannin test are blackish green, so it can be concluded that the ethanol extract of teki grass tubers is positive for tannins. These results are reinforced by Hasri's research (2018), which shows that the identification results of tannin compounds in ethanol extracts of these plants are also positive for tannins.

F. Analgesic Activity

Analgesics are drugs to reduce or eliminate pain without removing consciousness. In the combined analgesic effectiveness test of ethanol extracts of teki grass bulbs and moringa leaves in male mice using the writhing method, it was found that the teki grass bulbs and moringa leaves used as drugs with the same secondary metabolite content, namely flavonoid compounds and alkaloid compounds. Flavonoid compounds are used to inhibit cyclooxygenase enzymes that can reduce prostaglandin synthesis and alkaloid

compounds are used to inhibit prostaglandin biosynthesis which has potential as an analgesic. In this study, mice were divided into seven groups (negative control) CMC-Na, (positive control) paracetamol 500 mg / 70 kgbb, single dose of teki grass tuber extract, single dose of Moringa leaf and three dose comparison groups (1: 1; ½: ½; ¼: ¼). Each mice was given the test preparation orally one hour later followed by 1% acetic acid induction intraperitoneally. The test results were analyzed by SPSS (Statistical Product and Service Solutions) with one way anova and then tested with post hoc games-howell test. The results showed no significant difference between the positive control and all test groups so that it can be said that all test groups have a good analgesic effect because they are equivalent to paracetamol. The effective dose resulted from the comparison of ethanol extracts of teki grass tubers and moringa leaves ½: ½, because it has the highest percent value of analgesic effectiveness and percent value of writhing protection than other test groups 48.19% and 98.75% (Lina & Rahmawaty, 2022).

IV. CONCLUSION

Based on the literature study that has been carried out, it can be concluded that:

1. Chemical compounds identified in teki grass plants include flavonoids, alkaloids, tannins, saponins, essential oils and sesquiterpenoids.
2. Pharmacological activities found in teki grass plants are wound healing, anti-inflammatory, antimicrobial, antibacterial, antioxidant and analgesic activities.

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