



**PHARMACOLOGICAL ACTIVITY OF INDONESIAN MEDICINAL PLANTS AS
ANTHELMINTIC – A REVIEW**

Intan Aulia Pratiwi, Aditya Maulana Akbar, Auliya Azizah, Dhevi Maharani, Faiza Nashita Warda Marwa, Lisna Wati, Nabila Syarifatul Husen, Nidah Amelia, Nurhasanah Aini, Queen Maria Habibah, Sinta Nurjanah, Talitha Yusepha Oktaviani, Widia Arrahmah Rizki Saputri, Widiya Rahmayanti, Wiwit Meilani Putri, and Maulana Yusuf Alkandahri*

Faculty of Pharmacy, Universitas Buana Perjuangan Karawang, Karawang, West Java, Indonesia.



*Corresponding Author: Maulana Yusuf Alkandahri

Faculty of Pharmacy, Universitas Buana Perjuangan Karawang, Karawang, West Java, Indonesia.

Article Received on 16/11/2024

Article Revised on 05/12/2024

Article Accepted on 26/12/2024

ABSTRACT

Worm infection is one of the diseases that affect food production and have an economic impact in tropical regions, including Indonesia. Control of worm infections still largely relies on synthetic anthelmintic drugs. Currently, researchers are starting to look for new anthelmintic compound candidates derived from natural materials that have been empirically proven to have anthelmintic effects. This is done to replace anthelmintic drugs that currently have many side effects. Scientific tests have demonstrated the anthelmintic activity of several native Indonesian medicinal plants, such as *Tamarindus indica*, *Psidium guajava*, *Moringa oleifera*, *Camellia sinensis*, *Annona muricata*, *Myrtus communis*, and *Syzygium samarangens*, through different mechanisms. Therefore, this review article discusses the potential of several native Indonesian medicinal plants that have anthelmintic effects.

KEYWORDS: Anthelmintic, Medicinal plants, *Tamarindus indica*, *Psidium guajava*, *Moringa oleifera*, *Camellia sinensis*, *Annona muricata*, *Myrtus communis*, *Syzygium samarangens*.

INTRODUCTION

Helminth infections are one of the most common among humans, affecting a large proportion of the world's population. In developing countries, helminth infections pose a major threat to public health and contribute to the prevalence of malnutrition, anemia, eosinophilia, and pneumonia. Anthelmintics are drugs that either kill or expel infesting worms, which are primarily found in the gastrointestinal tract. However, some worms may also reside in the tissues, or their larvae may migrate there. They harm the host by depriving it of food, causing blood loss, organ injury, intestinal or lymphatic obstruction, and by releasing toxins. Helminthiasis is rarely fatal but is a major cause of morbidity.^[1] Researchers have reported concerning side effects from currently available anthelmintic drugs, prompting the search for new anthelmintic agents derived from natural materials like herbal plants. Indonesia is the second-largest country in the world with forest biodiversity, where there are 28,000 plant species and 2,500 medicinal plants.^[2,3] Other researchers are currently exploring active compounds from natural ingredients, particularly medicinal plants that people have traditionally used to treat worm infections in various regions of Indonesia.^[4-6] The goal is to find new anthelmintic compounds that

have mild side effects with low toxicity, so they do not harm patients.^[7,8] This review article discusses several Indonesian medicinal plants that have anthelmintic effects.

Tamarindus indica

Traditional medicine uses various parts of the *Tamarindus indica* tree, a member of the *Caesalpiniaceae* family, for analgesic, anti-inflammatory, diuretic, fever reducer, anthelmintic, antifungal, and gastrointestinal problems.^[9] Researchers have reported that administering *T. indica* at concentrations of 5, 10, and 15 mg/mL effectively kills *Pheretima posthuma* and *Tubifex tubifex* worms *in vitro*.^[10]

Psidium guajava

Tropical countries, including Indonesia, have traditionally used *Psidium guajava*, commonly known as guava, as a medicinal plant for a long time. *P. guajava*, a member of the *Myrtaceae* family, serves as an anti-inflammatory, analgesic, anti-diabetic, anti-hypertensive, anti-microbial, antioxidant, antibacterial, and antitumor drug.^[11,12] Other researchers have reported that administering *P. guajava* at concentrations of 25, 50, 75,

and 100 mg/mL kills *Pheretima posthuma* worms *in vitro*.^[13]

Moringa oleifera

Moringa oleifera is a plant belonging to the *Moringaceae* family that is traditionally used as an anti-asthmatic, antidiabetic, hepatoprotective, anti-inflammatory, anti-fertility, anti-cancer, antimicrobial, antioxidant, cardiovascular, anti-ulcer, central nervous system activity, anti-allergic, wound healing, analgesic, and antipyretic.^[14] Researchers reported that administering *M. oleifera* at concentrations of 0.95, 1.95, 3.9, 7.8, and 15.6 mg/mL killed *Haemonchus contortus* worms *in vitro*.^[15]

Camellia sinensis

Camellia sinensis is a plant belonging to the *Theaceae* family that grows mainly in tropical and subtropical climates.^[16] Studies have reported that this plant possesses antioxidant, anti-inflammatory, anti-cancer, cholesterol-lowering, and cardiovascular protection effects.^[17,18] Dwivedi *et al.*, reported that administering *C. sinensis* at concentrations of 50 and 100 mg/mL kills *Pheretima posthuman* worms *in vitro*.^[19]

Annona muricata

Annona muricata (Annonaceae) is a tropical plant species known for its edible fruit that has several medicinal properties. Traditional use of *A. muricata* has been identified in tropical areas to treat various diseases such as fever, pain, respiratory and skin diseases, internal and external parasites, bacterial infections, hypertension, inflammation, diabetes and cancer. More than 200 chemical compounds have been identified and isolated from this plant; the most important are alkaloids, phenols and acetogenins.^[20] In addition, many studies have reported the therapeutic effects of *A. muricata*, such as anti-tumor, anti-helminthic, anti-fungal, antibacterial, hypotensive, anti-viral and anti-inflammatory effects.^[21] Administration of *A. muricata* at concentrations of 6.25%, 12.5%, 25% and 50% v/v has been reported to kill *Haemonchus contortus* worms *in vitro*.^[22]

Myrtus communis

Myrtus communis is a plant belonging to the *Myrtaceae* family that is traditionally used as a medicinal herb throughout the world. A large number of components have been isolated from this plant, including polyphenols, myrtucommulone, semimyrtucommulone, 1,8-cineole, α -pinene, myrtenyl acetate, limonene, linalool and α -terpinolene. This plant is traditionally used for treatments such as diarrhea, gastric ulcers, hemorrhoids, inflammation, lung and skin diseases. In addition, many studies have reported the therapeutic effects of *M. communis* as an antioxidant, anticancer, anti-inflammatory, diabetic activity, antiviral, antibacterial, antifungal, hepatoprotective, and neuroprotective.^[23] Administration of *M. communis* at a

concentration of 2 mg/mL was reported to kill *Haemonchus contortus* worms *in vitro*.^[24]

Syzygium samarangens

Syzygium samarangens is a plant belonging to the *Myrtaceae* family that is traditionally used for various medicinal and non-medical purposes. The roots and fruits are consumed to relieve the effects of alcohol hangovers, while the leaves are traditionally consumed to treat various diseases such as diabetes mellitus, hypertension, ulcers, stomach ulcers, diarrhea, skin diseases, and infections.^[25] Administration of *S. samarangens* with concentrations of 25, 50, 100 and 200 mg/mL has been reported to kill *Haemonchus contortus* worms *in vitro*.^[26]

CONCLUSION

Indonesia is a country that has various types of medicinal plants that have potential properties to be developed as alternative medicines for treating worm infections. All of these plants have been empirically proven and scientifically tested to be used as anthelmintics. This is inseparable from the active compounds contained in these plants which have anthelmintic properties with different working mechanisms. Research on these medicinal plants is expected to be used to improve the treatment of the latest worm infections which are now showing many adverse side effects.

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