


The Effect Of *Acalypha Indica* Linn (Anting Anting Leaves) On *Staphylococcus Aureus* Causes Pioderma

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Article Info	ABSTRACT
<p>Keywords: <i>Acalypha indica</i> l, <i>staphylococcus aureus</i>, pyoderm</p>	<p>Indonesia is a country rich with various types of plants that have medicinal properties, both from the types of fruits, vegetables, spices, food crops and plants that grow wild around us. <i>Acalypha indica</i> (L) is a family of Euphorbiaceae, is an annual plant and is commonly found in gardens, roadsides, rubbish bins, fields throughout the plains of India. The method used is literature review with Narrative Review design. The results obtained in this literature are that there are 7 articles obtained with restrictions from 2017 - 2023 and an in-depth analysis of the strengths and limitations of each article on the effects of <i>acalypha indica</i> l. (earring leaf) on <i>staphylococcus aureus</i> that causes pyoderma., 7 articles discussing <i>acalypha indica</i> l (earring leaves) against <i>staphylococcus aureus</i> that causes pyoderma, 1 article mentions that <i>acalypha indica</i> l (earring leaves) is formulated in antibacterial ointment preparations (journal 4), Furthermore, the author identified 1 article that discusses the ethanol extract of earring leaves with concentrations of 5 grams, 10 grams and 15 grams showing the results of the inhibition zone on <i>Stapylococcus aureus</i> bacteria (journal 1). There is 1 article that discusses earring root extract has weak antibacterial activity against <i>S. aureus</i> and MRSA with MIC values of 50 and 100 mg/mL. (Journal 2). Based on the results of the identification and review of several in this literature review, it can be concluded that there is an effect of <i>acalypha indica</i> l. (earring leaf) against <i>staphylococcus aureus</i> that causes pyoderma. <i>Staphylococcus aureus</i> is one of the bacteria that most often infects humans. Plants that have potential as antibacterials are earring plants.</p>
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INTRUDUCTION

Indonesia is a rich country with various types of plants that have medicinal properties, including fruits, vegetables, spices, food plants and plants that grow wild around us. The high diversity of Indonesian plants makes Indonesia a country with a source of various potential bioactive ingredients. These various bioactive materials can be used especially in the industrial, health and pharmaceutical fields .¹

Acalypha indica (L) is of the Euphorbiaceae family , is an annual plant and is generally found in gardens, roadsides, garbage bins, fields throughout the plains of India and is

commonly known as "Kuppaimeni" .³ *Acalypha indica* has characteristics including: perennial plant with a height of 0.5-1 m, monoecious. *Acalypha indica* has small branches. Leaves are often clustered with slender petioles measuring 1.5-3.5 cm. The leaves are rhombic to ovate or subovate with a size of 2–3.5 × 1.5–2.5 cm. The basal part is cuneate and the leaf margins are serrate with 5 veins. Inflorescences emerge from leaf axils, unbranched, 2-7 cm in size. Bisexual flowers with short flower stalks. Proximal female flower bracts 3–7 in number. The distal male flower bracts are short with a triangular or triangular ovate shape. The female flowers are at the top. There are 5-7 male flowers per bract. Pedicel is 0.5 mm long with 4 sepals, 0.4 mm calyx and 8 stamens. Female flowers are sessile with 3 sepals, triangular and 0.5 mm in size, ciliated. Has 3-locular capsule fruit. Seeds are egg-shaped with a size of 1.5 mm. Easy to find in grasslands, wastelands, roadsides at heights below 100 m above sea level.⁴

A. indica has a round, woody stem, smooth hairy surface, wet stem type, with a green color on the outside and a whitish color on the inside. The leaves are green, oval in shape, single, the tip is tapered and the base is blunt, the edge of the leaf is serrated, the surface of the leaf is smooth, and pinnate venation. The anting-anting plant as a traditional medicine can be consumed and is part of the diet in West Africa. The results of phytochemical identification of leaf extracts found the presence of saponins, tannins and essential oils. The results of phytochemical tests on *Acalypha indica* leaves showed the presence of acaindinin, aurantiamide, corilagin, ferulic acid, resin and triacetamide.⁵

Additionally, this plant is also found in many parts of Asia, including India, Pakistan, Sri Lanka and throughout Tropical Africa and South America. *A. indica* is used as a treatment for vomiting, expectorant, laxative, diuretic bronchitis, pneumonia, asthma and pulmonary tuberculosis. In medicine, this plant is used for chronic coughs, bleeding in the lungs, hemoptosis and phthisis.³

Pyoderma is defined as any purulent skin disease and is an infection in the epidermis and dermis (for example, impetigo contagiosa, bullous impetigo, ecthyma, erysipelas, cellulitis, etc.) or in the hair follicles (for example, superficial folliculitis, deep folliculitis, furuncle, or carbuncle). The majority of these skin infections are caused by *Staphylococcus aureus* and Group A *Streptococcus*.⁸

This bacterial infection is still a health problem that causes morbidity for children and adults. To date there are no epidemiological prevalence studies large-scale pyoderma. Staphylococcal infections of the skin are most common caused by *S. aureus*. This bacteria is normal skin flora, but can be pathogenic; It can be transmitted through skin or object contact.⁶

Staphylococcus aureus is a germ that can cause disease with characteristic signs, namely inflammation, necrosis and abscess formation. The infection can range from a mild boil on the skin to a fatal pyemia. These germs are spherical in shape, with a germ diameter of between 0.8 – 1.0 microns. In direct preparations, they can be seen in pairs, clustered and can even be arranged like short chains. This germ is immobile, non-sporulating and gram positive.⁷

Bacterial infections due to *Staphylococcus aureus* have been widely reported in

various countries in Asia. This is supported by the WHO statement in 2020 that *S. aureus* is one of the bacteria that most often causes infections in humans. *Staphylococcus aureus* and MRSA are pathogenic bacteria that are often acquired from the community and hospitals. The prevalence of infections due to *S. aureus* and MRSA varies greatly between countries or regions, but in Indonesia alone the prevalence of MRSA reaches 52%. In 2019, from the results of *S. aureus* cultures in 41 hospitals in Indonesia, it was found that 21% of them were methicillin-resistant bacteria. Pathogens that are resistant to methicillin have the potential to be resistant to other antibiotics, so this will have a major impact on the level of treatment costs and morbidity and mortality rates. ²

Infection is the type of disease that is most commonly suffered by people in developing countries, including Indonesia. One of the causes of infectious diseases is bacteria. Pyoderma is a skin disease caused by *Staphylococcus aureus*, *Streptococcus* or both. Predisposing factors for pyoderma are poor hygiene, decreased resistance and the presence of other diseases on the skin, making it easier for infection to occur. The classification of pyoderma can be primary (eg impetigo, eczema, cellulitis) if it occurs on normal skin, or secondary if it is a complication of existing conditions such as atopic dermatitis, dermatophytosis and scabies. ⁷ The aim of the author is to see the effect of *Acalypha indica* L. (anting anting leaves) on *staphylococcus aureus* which causes pyoderma

METHOD

This research uses a literature review study to write this article. The author uses several journals both international and national obtained from various sites such as Google Scholar, Pubmed and Science Direct. The keywords used for the literature search process were " *acalypha indica* L " " *staphylococcus aureus* " "pyoderma" . The journal used in this research must meet the inclusion criteria, namely *Acalypha indica* L , publication year since 2017 , research population is *Acalypha indica* L. Meanwhile, the exclusion criteria were publication year before 2017 and populations other than *Acalypha indica* L and *Staphylococcus aureus* . From the search results on Google Scholar, we found 41 articles using the keywords we chose. Then, after we sorted according to the inclusion and exclusion criteria, we obtained 4 articles which we will review. Meanwhile, on Sciencedirect, 16 journal articles were found which were then sorted again so that there were 9 journals that met the criteria, then on Pubmed there were 4 journal articles, and there were 3 journals. The total number of journals that we will review is 7 journals.

RESULT

No	Title	Researcher Name.	Design	Results	Year
1.	Antibacterial Test of Hand Washing Soap Formulation with Ethanol Extract of Anting-Anting Leaves (<i>Acalypha Indica</i> L.) Against <i>Staphylococcus Aureus</i> Bacteria	Juni Krisdayanti Gulo, M. Pandapotan Nasution	Experimental research	The research results show that simplicia powder and ethanol extract of anting-anting leaves contain chemical compounds of alkaloids, saponins, tannins, flavonoids and essential oils. The results of the organoleptic test of liquid soap have a distinctive smell of perfume earring leaves, a blackish brown color with a liquid form. The stability test results of all formulas are stable. The pH test ranges from 9.73-10.8. The foam height test ranges from 50-80 mm. The viscosity test results ranged from 825-1330 cpoise. Specific gravity test results range from 1.01 to 1.02. Antibacterial activity at concentrations of 5%, 10%, 15% and the positive control had an inhibitory power of 16.0 mm, 17.7 mm, 17.8 mm and 20.0 against <i>Staphylococcus aureus</i> bacteria.	2022
2.	Activity of Anting-Anting (<i>Acalypha indica</i>) root extract on the growth of susceptible and resistant <i>Staphylococcus aureus</i>	Tina Rostinawati, Rahadatul A. Chaniago, Ade Zuhrotun	Experimental research	The results showed that the Minimum Inhibitory Concentration (MIC) value of anting-anting root extract against <i>S. aureus</i> and MRSA was 50 and 100 mg/mL. These bacteria can become resistant and form biofilms,	2023

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No	Title	Researcher Name.	Design	Results	Year
				making it difficult to treat infections. One way to treat infections other than medication is to use natural ingredients. This research was conducted to test the activity of anting-anting root plants on the growth and formation of <i>S. aureus</i> and MRSA. The methods used include extraction, chemical content testing using Gas Chromatography Mass Spectrometry, antibacterial activity testing and MIC determination. Compounds that have antibacterial activity found in the extract are hexadecanoic acid methyl ester, methyl ferulate and actinidin. The results showed that the MIC value of ant nest root extract against <i>S. aureus</i> and MRSA was 50 and 100 mg/mL.	
3.	Phytochemical Properties of <i>Acalypha indica</i> (L), and its Antimicrobial Potential against Human Pathogens	V. Thamil Priya, N. Balasubramani-an, V. Shan-mugaah & C. Karunakaran	N. Experimental research	We found that Ethanol was the most preferred solvent for maximum amount of <i>A. indica</i> extract followed by Acetone, however acetone had more antimicrobial activity. Additionally, we found Benzene and Diethyl ether were low yield solvents for <i>A. indica</i> extract. <i>A. indica</i> extract on antimicrobial activity showed extraordinary activity on <i>S. typhi</i> , <i>B. cereus</i> followed by <i>S. epidermidis</i> . Eight, the	20 20

No	Title	Researcher Name.	Design	Results	Year
				phytochemicals tested on the <i>A. indica</i> extract showed that it contained tannins, saponins, alkaloids, flavonoids and phenols. The solvents petroleum ether and ethyl acetate (4.2: 0.8), are the most optimal for separating more compounds by TLC analysis. Four main spots were detected on <i>A. indica</i> . Of these four spots, two main spots were streaked on a TLC plate and examined for antimicrobial activity against the <i>B. cereus</i> pathogen. <i>B. cereus</i> was selected based on our preliminary results, which showed significant activity among other pathogens.	
4.	Antibacterial Activity Test of Anting Anting (<i>Acalypha Indica</i> L) Leaf Extract Ointment against <i>Escherichia Coli</i> and <i>Staphylococcus Aureus</i> Bacteria	Sri Wijayanti, Tri Setio Astuti, Fauzan Amin, Ninik Triayu Susparini	Experimental research	Test results for <i>E. coli</i> bacteria were negative and <i>S. aureus</i> bacteria were negative. Based on the stability test, the results obtained were that it had homogeneous physical properties, with a pH of 6 and a spreadability of 5.9 – 6.7 cm. It can be concluded that in this study the ethanol extract of anting-anting leaves can be formulated into an antibacterial ointment. Judging from the activity of the <i>E. coli</i> and <i>S. aureus</i> bacteria, negative results were obtained. All formulas meet the requirements	2022

No	Title	Researcher Name.	Design	Results	Year
				in KBPOM regulation Number 12 of 2014.	
5.	Formulation and Antibacterial Activity Test of Staphylococcus aureus Microemulsion of Anting-anting (<i>Acalypha indica</i>) Leaf Extract Using Isopropyl Myristat as Oil Phase	Jauharatul Husniyah, Rahmi Annisa, and Burhan Ma'arif	Experimental research	The results showed that the <i>A. indica</i> leaf extract microemulsion had good physical characteristics with a pH value between 4.9-5.8, thick oil type, particle size F1 9.34 μm , F2 14.22 μm and F3 9.68 μm and physically stable at temperatures of $25^{\circ}\pm 2^{\circ}\text{C}$ and $40^{\circ}\pm 2^{\circ}\text{C}$. The results of the antibacterial activity test showed that F1 was not significantly different from the positive control. However, the inhibitory power of F1 was still under the positive control of clindamycin, namely 12.98 mm and 15.05 mm. So it can be concluded that F1 is an ideal formula that has good physical characteristics and optimal inhibitory power.	2018
6.	Determination of Minimum Concentration of Anting-Anting (<i>Acalypha indica</i> L.) Leaf Extract as an Antibacterial on <i>Staphylococcus aureus</i>	Aulia Nuanza Alam, Siti Harnina Bintari, Ibnul Mubarak.	Experimental research	The results of measuring the total content of flavonoid compounds in anting-anting leaf extract obtained an average of 18.84 mg QE/gram of extract. The zone of inhibition obtained from each treatment was different and increased with higher extract concentrations. The average size of the inhibition zone for extract concentrations of	2017

No	Title	Researcher Name.	Design	Results	Year
				20, 40, 60, 80, 100 (mg/mL) was 14.53; 18.46; 19.46; 20.65; 23.14 (mm). Based on this research, the minimum concentration of anting-anting leaf extract as an antibacterial for <i>S. aureus</i> is 20 mg/mL, equivalent to a flavonoid concentration of 0.38 mg QE/gram of extract.	
7.	Differences in the Growth of <i>Staphylococcus aureus</i> Bacteria When Giving Anting-Anting Leaf Juice and Bahagia Leaf Juice	Dita Artanti, Eka Radiawati	Experimental research	The results of the study showed that there was no difference in the growth of colonies of <i>Staphylococcus aureus</i> bacteria treated with Anting-anting leaf juice (<i>Acalypha indica</i> L.) and happy leaf plants (<i>Dieffenbachia bowmanii</i>) which was characterized by no colony growth. So a concentration of 100% in both leaf juices is the best concentration that can be used to control the growth of <i>Staphylococcus aureus</i> .	2020

Discussion

Botanical research in pharmaceuticals plays an important role in delineating the therapeutic potential of medicinal plants, providing a basis for the development of new pharmaceutical agents. *Acalypha indica* L., commonly known as “Anting-anting,” is an important botanical specimen with a rich history of traditional use in various medicinal practices. Exploration of its macroscopic and microscopic characteristics serves as a fundamental step in understanding its pharmacognosics, providing valuable insights into promising pharmaceutical applications.⁹

This article aims to look at the effect of *Acalypha indica* l. (anting anting leaves) on *Staphylococcus aureus* which causes pyoderma. Based on the results of a literature search, 7 journals were found which stated that *Acalypha indica* l. (anting anting leaves) is an inhibitor of the growth of *Staphylococcus aureus* . The journals above are experimental research.

Seven articles were analyzed using a synthesis table to see the variables studied by each study regarding the effect of *Acalypha indica* l (anting anting leaves) on *staphylococcus aureus* which causes pyoderma. Of the 8 articles that discuss the effects of *Acalypha indica* l (anting anting leaves) on *staphylococcus aureus* which causes pyoderma, 1 article states that *acalypha indica* l (anting anting leaves) is formulated in an antibacterial ointment (journal 4).

One of the strengths of some of these articles is that the procedures used in experimental research allow researchers to isolate specific variables on almost any topic. This one advantage provides the possibility to determine whether the results are worth it. Variables can be controlled alone or combined with others to determine what can happen when each scenario is completed. Because experimental research offers a higher degree of control than other available methods. It offers results that provide a higher level of relevance and specificity. The research results are likely to have superior consistency as well.

One limitation that needs to be noted in some of these articles is that they require a certain level of variable control, these studies run a high risk of error from the researcher at some point during the study. Any error, whether systemic or random, can reveal information about other variables and that will negate the validity of the type of experiment and research carried out. In order to be carried out well, experimental research must isolate each variable and test it. In addition, product variables, theories, or ideas are under strict control so that the resulting data can be corrupted or inaccurate, but still appear genuine. This can work in two negative ways for researchers.

Furthermore, the author identified 1 article which discussed the ethanol extract of anting-anting leaves with concentrations of 5 grams, 10 grams and 15 grams showing the results of the inhibition zone for *Stapylococcus aureus* bacteria (journal 1). There is 1 article which discusses that anting-anting root extract has weak antibacterial activity against *S. aureus* and MRSA with MIC values of 50 and 100 mg/mL. (Journal 2).

CONCLUSSION

Based on the results of identification and several studies in this literature review, it can be concluded that there is an effect of *Acalypha indica* L. (anting anting leaves) on *Staphylococcus aureus* which causes pyoderma. *Staphylococcus aureus* is one of the bacteria that most often infects humans. A plant that has antibacterial potential is the anting-anting plant.

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