

REVIEW ARTICLE

Paliasa (*Kleinhovia hospita* L.) As An Immunomodulator: A Scooping Review

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ABSTRACT

Paliasa (*Kleinhovia hospita* L.) is one of the tropical plants of South Sulawesi that has high antioxidants with phenol compounds, alkaloids, flavonoids, polyphenols, kaempferol, quercetin, and cyanogenic. Empirically, the Paliasa plant (*Kleinhovia hospita* L.) has been used to treat various diseases, such as cancer, stroke, hypertension, hepatitis, cirrhosis of the liver, diabetes mellitus, and allergies. The goal of the study was to see how effective Paliasa was as an immunomodulator. The literature review approach used is an online search using google chrome programs on PubMed and Google scholar sites with the keywords "*Kleinhovia hospita* L.", immune system ", immunomodulator ", and "inflammation". The sources selected are national and international journals, which are then selected based on inclusion criteria, namely journals published between 2016 and 2021 as many as 20 journals with the type of research articles or original articles. While the exclusion criteria is a journal with a type of review article. The study found the anti-inflammatory and immunomodulatory activity of Paliasa. The benefit of research is to provide information about the efficacy of Paliasa as an immunomodulator to boost immunity.

Keywords: *Kleinhovia hospita* L., Immune System, Immunomodulator, Inflammation, Paliasa

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INTRODUCTION

The use of synthetic drugs in overcoming immune system disorders either as immunostimulants or immunosuppressants often causes health problems that have adverse effects on the kidneys and liver and can trigger digestive disorders (7). Although the public as consumers recognize the positive impact of consuming synthetic drugs, it cannot be forgotten that there may be side effects of using drugs that can harm the body's immune system, especially as immunomodulators. To overcome these concerns, people in the Indonesian archipelago usually use various traditional plants as immunomodulatory drugs because they are considered safe for the human body (8). One of the tropical plants that is often used in traditional medicine is Paliasa (*Kleinhovia hospita* L.).

Paliasa (*Kleinhovia hospita* L.) is a tropical plant that is widespread in the Indonesian archipelago and is often used by the community as a traditional medicine. Paliasa plants have several active compounds that can be used as immunostimulants and immunosuppressants

in modulating the immune system such as eleutherol, kaempferol 3-glucoside, cyanogenic, alkaloids, proanthocyanin, cyanidin, flavonols, kaempferol and quercetin and saponins (1-3). Paliasa as a traditional medicinal plant is often used by the community as an antipyretic (4), antitumor leukemia P-388 (5), and anti-inflammatory (6).

This review article aims to provide scientific and educational information about the potential of the traditional medicinal plant Paliasa as an immunomodulator.

Paliasa (*Kleinhovia hospita* L.)

Kleinhovia hospita L. is the only species in the genus *Kleinhovia*. Paliasa is found in various Indonesian islands such as Sulawesi, and East Kalimantan. (9). It was found that there were 109 isolates in various levels of innocence such as terpenoid group compounds, steroids, phenolics, flavonoids and alkaloids. (10). In addition, in the active extract of ethyl acetate from Paliasa leaves there are secondary metabolite compounds derived from terpenoids and stilbene. The stems were identified as containing flavonols, kaempferol, and quercetin, finding that the compounds kaempferol and quercetin could serve as antitumors (11). Hepatitis virus can be prevented and cured by consuming Paliasa plant extract. Therefore, empirically this Paliasa plant can be

used as a hepatitis drug is also suspected as an antitumor of leukemia P-388 (5).

Immune System

The immune system consists of 2 types, namely natural immunity and adaptive immunity. An uncontrolled immune system can cause a variety of immunological problems, including hypersensitivity, autoimmune diseases, and immune deficiencies (12). Immunodeficiency is a state in which components of the immune system cannot function normally. As a result, people with immunodeficiency will be more susceptible to viral, fungal, or bacterial infections, cancer, and also recurrent infections (reactivation of latent infections) (13). The function of the immune system can be improved or lowered in various ways, one of which is

by immunomodulatory injection. Immunomodulators are substances that interact with the immune system to stimulate or decrease the immunological response (14).

RESULT

The results of journal source searches that fall into the inclusion criteria are as many as 20 articles. The articles discuss the testing of immunomodulatory activity from *Kleinhovia hospita* L. Activity can be seen in Table I.

DISCUSSION

From the results of the literature review, 20 articles were obtained that showed various immunomodulatory effects of the Paliassa plant. Immunomodulators are materials

Table I: Activities of *Kleinhovia hospita* L.

No.	Source	Journal	Activity	Results
1.	(Hasanuddin and Andini, 2017)	Paliassa Leaf Extract-Free Antiradical Activity Test (<i>Kleinhovia hospita</i> L.)	Immunomodulators	Anti-free radicals.
2.	(Yuliana, 2017)	Evaluation of Protective Effects of Paliassa Leaf Extract (<i>Kleinhovia Hospita</i> L.) Against Increased Liver Lipid Peroxidation Activity In White Mice Induced With Doxorubicin.	Immunomodulators	Protects for increased MDA levels in white mice caused by doxorubicin injection.
3.	(Desiana, Yuliet and Ihwan, 2018)	Antipyretic effect of paliassa leaf extract (<i>Kleinhovia hospita</i> L.) on Male White Rats (<i>Rattus norvegicus</i> L.) Induced Tetanus Pertussis Diphtheria Vaccine.	Anti-inflammation	The ethanol extract of leaves Paliassa has antipyretic activity in male rats and the effective dose is 200 mg/kg BW.
4.	(Tayeb et al., 2019)	Paliassa (<i>Kleinhovia hospita</i> L.) Hepatoprotector "Tea Bag" preparation as supporting therapy in the use of a fixed-dose combination of antituberculosis drugs.	Immunomodulators	Hepatoprotective activity in reducing ALT and AST levels following administration of fixed-dose combination antituberculosis drugs for 28 days.
5.	(Suryani, Putri and Agustyani, 2019)	Paliassa Leaf Stability Formulation and Test Preparation (<i>Kleinhovia Hospita</i> L.) The Antioxidant Effect.	Anti-inflammation and immunomodulators	Paliassa leaves contain flavonoids which have antioxidant activity.
6.	(Najihudin, Rahmat and Anwar, 2019)	Formulation Of Instant Granules from Ethanol Extract of Tahongai (<i>Kleinhovia Hospita</i> L.) Leaves as Antioxidant.	Immunomodulators	The formula meets the requirements of physical properties of Granules and has antioxidant activity.
7.	(Abuzaid et al., 2020)	Potential Roles of <i>Kleinhovia hospita</i> L. Leaf Extract in Reducing Doxorubicin Acute Hepatic, Cardiac and Renal Toxicities in Rats.	Anti-inflammation and immunomodulators	Protected the rats from liver toxicity, but only at dose 250 mg/kg reduced cardiac toxicity.
8.	(Nusan et al., 2020)	Antimicrobial and anti-HCV activity of triterpenoid and alkaloid compounds from <i>Melochia umbellata</i> (Houtt.) Stapf var <i>Visenia</i> (Paliassa).	Anti-inflammation and immunomodulators	Anti-HCV tests on the two compounds showed IC50 values of 52.07 and 45.02 µg/ml, respectively.
9.	(Djabir et al., 2020)	<i>Kleinhovia hospita</i> extract alleviates experimental hepatic and renal toxicities induced by a combination of antituberculosis drugs.	Anti-inflammation and immunomodulators	Paliassa extract at a dose of 500 mg/kg has a protective effect against AT-induced elevation of total bilirubin serum in rats.
10.	(Sulistiarini, Soemardji and Iwo, 2020)	Activity of Tokulo (<i>Kleinhovia hospita</i> L.) as Anti Rheumatoid Arthritis and Anti-inflammatory in White Rats Induced by Complete Freud Adjuvant (CFA).	Anti-inflammation and immunomodulators	The ethanol extract of Tokulo leaves has anti-RA and anti-inflammatory activity in CFA-induced rats
11.	(Imran et al., 2021)	Bioactivity of Secondary Metabolites of Paliassa Logs (<i>Kleinhovia hospita</i> L.) with BST (Brine Shrimp Lethality Test) Test and Its Inhibitory Power In P-388 Leukemia Cells.	Anti-inflammation and immunomodulators	Antitumor leukemia P-388.
12.	(Sari, Rijai and Gama, 2016)	Anti-inflammatory Potential of Tahongai Leaf Extract (<i>Kleinhovia hospita</i> L).	Anti-inflammation and immunomodulators	Anti-inflammatory at a dose of 750 mg/kgBB.
13.	(Yuliana and Herawati, 2016)	Phytochemical Content and Protective Effect of <i>Kleinhovia hospita</i> Leaves Extract on Pancreatic Cytotoxicity in Hyperglycemic Rats.	Anti-inflammation and immunomodulators	Protective effect on pancreas cytotoxicity.
14.	(Anggraini, Herlina and Solihah, 2021)	Burns Healing Test from Tahongai Leaf Ethanol Extract (<i>Kleinhovia Hospita</i> L.) In male white Rats strain Sprague Dawley.	Anti-inflammation and immunomodulators	Administration of the test substance triggers epithelialization and collagenization processes.

continue

Table I: Activities of *Kleinhovia hospita* L.

No.	Source	Journal	Activity	Results
15.	(Rusli, Hafid and Badjadji, 2018)	Antibacterial Effectiveness Test Of Combination Of Paliasa (<i>Kleinhovia Hospita</i> L.) White Flower And Ungu Flower Varieties On The Growth Of <i>Staphylococcus Aureus</i> and <i>Escherichia Coli</i>	Anti-bacterial	The presence of inhibition against the growth of <i>Staphylococcus aureus</i> and <i>Escherichia coli</i> bacteria.
16.	(Rahim et al., 2018)	<i>Kleinhospitine E</i> and <i>Cycloartane Triterpenoids</i> from <i>Kleinhovia hospita</i> .	Anti-inflammation	Antiproliferative activities and anti-HIV activity.
17.	(Edy, 2021)	Balaroa Leaf Ethanol Extract Antioxidant Activity Test (<i>Kleinhovia Hospita</i> L.)	Anti-inflammation and immunomodulators	Moderate antioxidant.
18.	(Yunus and Malik, 2019)	Ndokulo Laughter Leaf Extract Bioactivity Test (<i>Kleinhovia hospita</i> L.) Against Enteropathogenic Bacteria.	Anti-inflammation	Antibacterial activity against <i>E. coli</i> and <i>Salmonella thypi</i> .
19.	(Djabir et al., 2019)	The protective effect of Paliasa (<i>Kleinhovia hospita</i> L.) leaf extract against elevated total bilirubin serum induced by toxic dose of antituberculosis in rats.	Decreases total bilirubin levels	Paliasa leaf extract was able to reduce the total bilirubin level of rats compared to the group that was only given AT suspension.
20.	(Rahim et al., 2018)	<i>Kleinhospitine E</i> and <i>Cycloartane Triterpenoids</i> from <i>Kleinhovia Hospita</i>	antiproliferative activities and submicromolar anti-HIV activity	Some compounds have the anti-proliferative ability and submicromolar anti-HIV activity.

that can restore and repair the immune system whose function is impaired or suppress excessive function. Immunomodulators can change the function of the immune system through the regulation of immune cells such as cytokines. The effects of immunomodulators can be either immunosuppressant or immunostimulant. The mode of action of immunomodulators includes restoring impaired immune function, enhancing immune system function (immunostimulation), and suppressing immune responses (immunosuppression). Immunomodulators are used primarily in immune deficiency diseases, chronic infections, and cancer. Interestingly, from the review articles obtained from 2016-2021, it shows the dominance of anti-inflammatory effects through the testing of active compounds such as flavonoids and Triterpenoids found in Paliasa extract.

Research on the potential of Paliasa as an anti-bacterial, and anti-tumor is also widely reviewed. In addition, tests using white rats as experimental animals showed the ability of Paliasa to reduce serum bilirubin levels and anti-cancer cell proliferation (23). The most interesting thing is the content of Cycloartane Triterpenoids compounds in Paliasa shows submicromolar anti-HIV activity (7).

This study has several limitations, including limited scientific literature and some scientific articles that are not relevant to the research objectives. Qualitative and quantitative testing of active compounds present in the leaves and stems of the Paliasa plant needs to be done and also needs to be tested in vitro and in vivo, so that it is hoped that it can further determine the various properties of the Paliasa plant both as an immunostimulant and immunosuppressant.

CONCLUSION

From the results of literature studies conducted, *Kleinhovia hospita* L. is an herbal plant that is efficacious as an anti-inflammatory as well as an immunomodulator.

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