The Antioxidant Potency of Jeruju Leaves (*Acanthus ilicifolius*)

Yuliana[1*]

[1] Department of Anatomy, Faculty of Medicine, Universitas Udayana
Jl. P.B. Sudirman, Denpasar, Bali, Indonesia
[*]**Correspondence** : E-mail: yuliana@unud.ac.id, Phone 0361 222510

ABSTRACT

Jeruju leaves are known as Acanthus ilicifolius. It is commonly found in the mangrove in Indonesia. It has many usages such as antibacterial and anti-inflammatory. However, less is known about its antioxidant potency. This paper aims to describe the antioxidant potency of jeruju leaves. Method: It is a narrative literature review. Literature was taken from PubMed, Science Direct, and Google Scholar. The inclusion criteria are research and review. Exclusion criteria are unavailable in full-text journals. Results revealed that due to antioxidant properties, jeruju leaves can be used as anti-acne creams. It showed the best result at 15% extract concentration for anti-acne. Besides that, jeruju leaves can be used as antiatherosclerotic and lipid-lowering agents. The leaves and stems parts have antioxidant contents as well, such as terpenoid, flavonoid, saponin, and tannin. However, a toxicity test has to be done before administering for long period. In conclusion, the antioxidant properties of jeruju leaves are related to anti-atherosclerotic, lipid-lowering agents, and anti-acne as well. Further studies are needed to explore the functions and toxicities of jeruju leaves before routinely administered.

Keywords: *Acanthus ilicifolius, antioxidant, jeruju*

INTRODUCTION

Jeruju (daruju) is known as Acanthus ilicifolius Linn (Acanthaceae) (1–5). It is also called Hargoza in India, Asia, northern Australia, and Africa (6). It is commonly found in the mangrove (mouth of the river) in Indonesia (West Sumatera and South Kalimantan). In Ayurvedic medicine, it is called Sahachara (rheumatic treatment). Sea Holly is also another name for the Acanthaceae family. It has many uses such as antibacterial, anti helmintic, analgesic, and anti-inflammatory. However, less is known about its antioxidant potency. As an antioxidant, jeruju is used as an anti-acne, antidiabetic, or anti atherosclerotic. Other benefits of jeruju are diuretics, anti-diabetes, skin problems, hepatitis, rheumatic, or snake bite. In India and China, jeruju is used as diuretics, anti-asthma, anti-diabetes, also leprosy medicine, and hepatitis treatment (1,6–21).

Jeruju leaves and stems have many usages such as antioxidant, neuralgia (anti nociceptive), anti-inflammation, analgesic, gastrohepato-protective, anti-fertility, antitumor, antifungal (Candida albicans, Aspergillus), antivirus, anti-microba, anti-bacteria (Shigella sp, Salmonella Typhi, Propionibacterium acne), Enterococcus faecalis, and insecticide (1,14,30,31,22–29).

The phytochemical components of jeruju are saponin, triterpenoid, lignans, alkaloid, flavonoid, phenolic, saponin, and tannin (6,14,15,17,32–35). These phytochemical components are very critical for antioxidant properties. Due to rich phytochemical components, this plant is used as remedy for many diseases. It can be used as natural remedy for skin problems such as acne and lowering blood glucose agents (1,6).

Jeruju leaves can absorb free radicals based on their antioxidant property. It also has anticoagulant and anti-cancer properties. Free radical scavenging is the main task of antioxidants (17,33)(36). Besides free radical

scavengers, jeruju leaves also have some critical roles as DNA synthesis inhibitors and free radical scavengers (17,37). The hydroxyl group is very essential to support the antioxidant activity (2). This paper aims to describe more about the antioxidant potency of jeruju leaves.

MATERIAL AND METHODS

It is a narrative literature review. Literature was taken from PubMed, Science Direct, and Google Scholar. The inclusion criteria are research and review. The exclusion criteria are unavailable full-text journals.

DISCUSSION

Due to its antioxidant properties, jeruju leaves can be used as anti-acne creams. It showed the best result at 15% extract concentration for anti-acne (1,38). Leaves, stems, and roots contain many bioactive compounds. Leaves show a higher level of antioxidants than other parts of the plants. Bioactive compounds are important for traditional medicine development. Therefore, Jeruju leaves are commonly used as traditional medicine for diabetes, cancer, and asthma (6,39,40).

An antioxidant is a special substance for fighting against free radicals. Free radicals induce oxidative stress. The results of excessive free radicals are diabetes, arthritis, atherosclerosis, etc. Natural sources contain many antioxidants that are useful in balancing endogenous antioxidants and free radicals (6). However, the antioxidant property of jeruju leaves is less than ascorbic acid (2). An antioxidant is very essential because it scavenges free radicals. Excessive free radicals damage cells. Therefore, antioxidants have protective effects on the cells (41)

Karim et al. studied that the administration of Acanthus ilicifolius (jeruju) extract reduced body weight in atherosclerotic rats. There were also significant reductions in lipid serum and systolic blood pressure. Meanwhile, HDL (high-density lipoprotein) level was elevated. Clotting and bleeding time were decreased significantly. The histopathological data revealed significant improvement in tissue morphology. The leaves and stems part of A. ilicifolius showed anti-atherogenic properties. Therefore, it can be recommended for cardiovascular disease prevention (6).

The major bioactive phytochemical constituent in the A. ilicifolius leaves is 2-benzoxazolinone (BOA). The bioactive component contains special molecules that have more value than crude extract. The special extraction technique is called supercritical CO2 extraction. This technique uses low temperatures. It enables the extraction of thermolabile substances without any destruction. BOA has anti-nociceptive and anti-inflammatory properties. BOA is a toxic substance to protect plants from herbivore attacks. Therefore, although this plant has antioxidant activity, it needs a toxicity test to make sure safety for human consumption (2). Based on the Brine Shrimp Lethality Test (BSLT) method, the cytotoxic activity was seen by hexane fraction with a value of 242.25 ppm. Meanwhile, the cytotoxic effect was not observed with the ethyl acetate, ethanolic, and butanol fraction (LC50 more than 1000 ppm) (15).

CONCLUSION

In conclusion, jeruju leaves can be used as antiatherosclerotic and lipid-lowering agents. The leaves and stems parts have antioxidant contents as well, such as terpenoid, flavonoid, saponin, and tannin. However, a toxicity test has to be done before administering for long period. Further studies are needed to explore the

functions and toxicities of jeruju leaves before routinely administered.

REFERENCES

1. Nusaibah, Pangestika W, Herry. Pemanfaatan ekstrak daun jeruju (Acanthus ilicifolius) sebagai bahan aktif krim anti acne. Agrikan J Agribisnis Perikan. 2021;14(1):16–24.
2. Arumugam S, Thiruganasambantham R. Standardized supercritical Co2 extract of acanthus ilicifolius (Linn.) leaves inhibits the pro-inflammatory cytokine tumor necrosis factor- A in lipopolysaccharide-activated murine. Asian J Pharm Clin Res. 2018;11(7):193–8.
3. Ariyanti EE. Potensi Hias dan Obat Daruju (Acanthus ilicifolius L.). War Kebun Raya. 2008;8(2):64–8.
4. Kartika T. Potensi Tumbuhan Liar berkhasiat obat di sekitar pekarangan kelurahan Silaberanti Kecamatan Silaberanti. Sainmatika J Ilm Mat dan Ilmu Pengetah Alam. 2017;14(2):89–99.
5. Putri R, Cevanti TA, Sumekar H. Sitotoksisitas Ekstrak Daun Mangrove Daruju (Acanthus Ilicifolius) Sebagai Bahan Irigasi Saluran Akar (The Cytotoxicity Of Daruju Mangrove (Acanthus Ilicifolius) Leaf Extract As Root Canal Irrigation). Dent J Kedokt Gigi. 2018;12(1):44–8.
6. Karim R, Begum MM, Alim A, Uddin S, Kabir T, Khan AF, et al. Effects of Alcoholic Extracts of Bangladeshi Mangrove Acanthus ilicifolius Linn. (Acanthaceae) Leaf and Stem on Atherogenic Model of Wistar Albino Rats. Evidence-Based Complement Altern Med. 2021;1–18.
7. Bora R, Adhikari PP, Das AK, Raaman N, Sharma GD. Ethnomedicinal, Phytochemical, and Pharmacological Aspects of Genus Acanthus. Int J Pharm Pharm Sci. 2017;9(12):18–25.
8. Wei P, Wu S, Mu X, Xu B, Su Q, Wei J, et al. Effect of alcohol extract of Acanthus ilicifolius L . on anti-duck hepatitis B virus and protection of liver. J Ethnopharmacol [Internet]. 2015;160:1–5.
9. Liu LIN, Fan HUI, Qi P, Mei YAN, Zhou L, Cai L, et al. Synthesis and hepatoprotective properties of Acanthus ilicifolius alkaloid A and its derivatives. Exp Ther Med. 2013;6:796–802.
10. Kumar KA. Chemical Constituents And Biological Activities Of A Mangrove Plant Acanthus Ilicifolius – A Review. IJCRT. 2020;8(6):2227–37.
11. Payinachulli M, Marandi M, Attumulli T. Phytochemical and pharmacological potential of. J Pharm BioAllied Sci. 2013;5(1):17–20.
12. Brades S. Uji Aktivitas Antioksidan Ekstrak Buah Jeruju (Acanthus ilicifolius L.) menggunakan metode DPPH (1,1-diphenyl-2-picrylhydrazyl). 2021.
13. Yanuarini AN, Widiyantoro A, Destiarti L. Senyawa Antiinflamasi Dari Fraksi Etil Asetat Daun Daruju (Acanthus Ilicifolius) Terhadap Udem Kaki Mencit (Mus Musculus) Yang Diinduksi Karagenan. J Kim Katulistiwa. 2018;7(2):82–8.
14. Puspitasari DF, Munisih S. Uji Total Flavonoid dan Uji Aktivitas Ekstrak Metanol Daun Jeruju (Acanthus Ilicifolius . L) terhadap Bakteri. Parapemikir J Ilm Farm. 2022;11(2):1–6.
15. Suryati, Husni E, Astuti W, Ranura

N. Karakterisasi dan Uji Sitotoksik Daun Jeruju (Acanthus illicifolius). J Sains Farm dan Klin. 2018;5(3):207–11.
16. Irawanto R, Ariyanti EE, Herdian R. Jeruju (Acanthus ilicifolius): Biji, perkecambahan dan potensinya. Pros Semin Nas Masy Biodiversitas Indones. 2015;1(5):1011–8.
17. Aisiah S, Rini RK, Tanod WA, Fatmawati F, Fauzana NA, Olga O. Metabolomic profiling of Jeruju (Acanthus ilicifolius) leaf extract with antioxidant and antibacterial activity on Aeromonas hydrophila growth. J Appl Pharm Sci. 2022;12(8):57–69.
18. Wei X, Wang H, Sun X, Huang X, Xu W, Liang Y, et al. 4-hydroxy-2(3H)-benzoxazolone alleviates acetaminophen-induced hepatic injury by inhibiting NF-κB and activating Nrf2 / HO-1 signaling pathways. Am J Transl Res. 2020;12(5):2169–80.
19. Sardar PK, Dev S, Bari A Al, Paul S, Yeasmin MS. Antiallergic , anthelmintic and cytotoxic potentials of dried aerial parts of Acanthus. Clin Phytoscience. 2018;4(34):1–13.
20. Nusaibah, Pangestika W, Herry. Characteristics of Acanthus ilicifolius Leaves as Raw Materials for Drugs and Cosmetics. Res J Pharm Biol Chem Sci. 2021;12(1):1–12.
21. Saranya A, Ramanathan T, Nadu T. Traditional Medicinal Uses , Chemical Constituents and Biological Activities of a Mangrove Plant , Acanthus ilicifolius Linn. : A Brief Review. Am J Agric Environ Sci. 2015;15(2):243–50.
22. Andriani D, Revianti S, Prananingrum W. Identification of compounds isolated from a methanolic extract of Acanthus ilicifolius leaves and evaluation of their antifungal and antioxidant activity Identification of compounds isolated from a methanolic extract of Acanthus ilicifolius leaves and eva. J Biol Chem. 2020;21(6):2521–5.
23. Kumar KTMS, Puia Z, Samanta SK, Barik R, Datta A, Gorain B, et al. The Gastroprotective Role of Acanthus ilicifolius – A Study to Unravel the Underlying Mechanism of Anti-Ulcer Activity. Sci Pharm ·. 2012;80(1):701–17.
24. Islam MA, Saifuzzaman M, Ahmed F, Rahman MM, Sultana NA, Naher K, et al. Antinociceptive activity of methanolic extract of acanthus ilicifolius linn. leaves. Turk J Pharm Sci. 2012;9(1):51–60.
25. Bose S, Bose A. Antimicrobial Activity of Acanthus ilicifolius (L .). Indian J Pharm Sci. 2008;70(6):821–3.
26. Ganesh S, Vennila JJ. Screening for Antimicrobial Activity in Acanthus ilicifolius. Sch Res Libr. 2010;2(5):311–5.
27. Zhang M, Ren X, Yue S, Zhao Q, Shao C. Simultaneous Quantification of Four Phenylethanoid Glycosides in Rat Plasma by UPLC-MS / MS and Its Application to a Pharmacokinetic Study of Acanthus. Molecules. 2019;24(1):1–11.
28. Kalaskar PS, Karande V V, Bannalikar AS, Gatne MM. Antifungal Activity of Leaves of Mangroves Plant Acanthus licifolius Against Aspergillus fumigatus. Indian J Pharm Sci. 2012;74(6):575–9.
29. Aryadi, Usboko MP. Efek Antibakteri Ekstrak Daun Mangrove (Acanthus Ilicifolius) Dengan Tiga

Jenis Pelarut Terhadap Bakteri Enterococcus Faecalis (In Vitro). J Kedokt Gigi Terpadu. 2021;3(2):34–8.
30. Ikhwan D, Rachmadi O, Dyah A, Putri A, Widiyantoro A. Reduksi Udema Kaki Mencit (Mus musculus) Terinduksi Karagenan Setelah Pemberian Ekstrak Daruju (Acanthus ilicifolius L .). Pharmacon J Farm Indones. 2020;17(2):86–91.
31. Pringgenies D, Setyati WA, Setiyo D, Djunaedi A. Aktivitas Antibakteri Ekstrak Jeruju Acanthus ilicifolius terhadap Bakteri Multi Drug Resistant. J Kelaut Trop. 2020;(23):2.
32. Firdaus M, Prihanto AA, Nurdiani R. Antioxidant and cytotoxic activity of Acanthus ilicifolius flower. Asian Pac J Trop Biomed. 2013;3(1):17–21.
33. Paul T, Ramasubbu S. The antioxidant, anticancer and anticoagulant activities of Acanthus ilicifolius L. roots and Lumnitzera racemosa Willd. leaves, from southeast coast of India. J Appl Pharm Sci. 2017;7(3):81–7.
34. Faysal MAR, Barek MA, Jahan S, Shahid-Ud-Daula AFM, Basher MA, Hasanuzzaman M. Petroleum Ether and Chloroform Soluble Fractions of Whole Plant Extract of Acanthus ilicifolis Linn . Possesses Potential Analgesic and Antioxidant Activities. Discov Phytomedicine. 2020;7(1):12–8.
35. Handayani S, Najib A, Wati NP. Uji Aktivitas Antioksidan Ekstrak Daun Daruju (Acanthus Ilicifolius L .) Uji Aktivitas Antioksidan Ekstrak Daun Daruju (Acanthus Ilicifolius L .) Dengan Metode Peredaman Radikal Bebas 1 , 1-Diphenyil-2-Picrylhidrazil. J Fitofarmaka Indones. 2018;5(2):299–308.
36. Wu J, Zhang S, Li Q, Huang J, Xiao Z, Long L. Two New Cyclolignan Glycosides from Acanthus ilicifolius. Z Naturforsch. 2004;59b(1):341–4.
37. Prasetyo MY, Hendri M, Putri WAE, Aryawati R. Isolasi Dan Purifikasi Senyawa Antioksidan Pada Daun Mangrove Avicennia Alba Dari Kawasan Muara Sungai Musi Kabupaten Banyuasin. Maspari J. 2022;(1):63–78.
38. Angghita AT, Miftah AM, Arumsari A. Review Artikel: Uji Aktivitas Antimikroba Ekstrak Daun Daruju (Acanthus ilicifoius L.) terhadap Beberapa Macam Bakteri Patogen. Pros Farm. 2020;6(2):913–7.
39. Chakraborty T, Bhuniya D, Chatterjee M, Rahaman M, Singha D, Chatterjee BN, et al. Acanthus ilicifolius plant extract prevents DNA alterations in a transplantable Ehrlich ascites carcinoma-bearing murine model. World J Gastroenterol. 2007;13(48):6538–48.
40. Fu XM, Zhang MQ, Shao CL, Li GQ, Bai H, Dai GL, et al. Supplementary Materials : Chinese Marine Materia Medica Resources : Status and Potential. Mar Drugs. 2016;14:S1.
41. Arsianti A, Mahindra SP, Azizah NN, Fajrin AM, Dameria L. Phytochemical Analysis , Antioxidant and Anticancer Effects of Clitoria ternatae Extract on Breast T47D Cancer Cells Phytochemical Analysis , Antioxidant and Anticancer Effects of Clitoria ternatae Extract on Breast T47D Cancer Cells. Indones J Med Chem Bioinforma. 2022;1(1):1–9.