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ANTIALLERGIC EFFECTS OF SOME MEDICINAL PLANTS IN INDONESIA – A REVIEW

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ABSTRACT
Allergy is an alteration in the body's response or an exaggerated defense mechanism in response to allergens, which are harmless substances. As a health issue, allergies have the potential to diminish an individual's quality of life. At present, scholars are commencing the search for novel anti-allergic compound candidates derived from naturally occurring substances that have demonstrated anti-allergic properties through empirical evidence. We undertake this in lieu of anti-allergy medications, which currently exhibit numerous hazardous adverse effects. Scientists have scientifically established anti-allergic activity in several indigenous Indonesian medicinal plants, such as *Allium sativum*, *Solanum lycopersicum*, *Centella asiatica*, *Psidium guajava*, *Kaempferia parviflora*, *Moringa oleifera*, and *Ocimum basilicum*. These plants employ various mechanisms to exert their effects. Therefore, this review article is aimed to discuss the potential of several native Indonesian medicinal plants which have anti-allergic effects.

KEYWORDS: Antiallergic, *Allium sativum*, *Solanum lycopersicum*, *Centella asiatica*, *Psidium guajava*, *Kaempferia parviflora*, *Moringa oleifera*, *Ocimum basilicum*.

INTRODUCTION

Immune dysfunction classifies allergy as a significant global health concern. Allergens include substances such as food, pollen, dust mites, cosmetics, mold spores, and animal dander that induce allergic reactions. A subsequent allergen exposure induces cross-linking of bound IgE, leading to the secretion of vasoactive amines, pharmacologically active mediators, from basophils and mast cells. Smooth muscle contraction, increased vascular permeability, and vasodilation are all effects of these mediators.[1] Mast cells or basophils produce histamine, which binds to histamine receptors H1, H2, H3, or H4 and significantly contributes to allergic responses.[2, 3] Histamine promotes vascular expansion and tissue remodeling and mediates the secretion of inflammatory cytokines.[4] The enzyme β-hexosaminidase is an essential component in the release of histamine. These enzymes are released at the same time as histamine, which is a known biomarker of allergic reactions, in mast cells.[5] Lipoxygenase facilitates histamine release through the metabolism of arachidonic acid.[6]

By impeding the secretion of histamine, different anti-allergic medications are capable of diminishing allergic reactions and inflammation through the reduction of histamine production. Regrettably, the administration of antiallergic drugs is accompanied by a multitude of adverse effects.[7] Nevertheless, certain botanical species possess anti-allergic properties and exhibit minimal to nonexistent adverse effects.[8,10] Presently, ongoing research endeavors are focused on discovering novel anti-allergic medications derived from natural sources. One such approach involves investigating active compounds present in natural ingredients, with particular attention given to medicinal plants that have historically been utilized for allergy treatment in Indonesia.[11,13] The objective is to identify novel anti-allergic compounds characterized by minimal toxicity and mild side effects so as to prevent patient harm.[14,16] Therefore, this review article is aimed to discuss the potential of several native Indonesian medicinal plants which have anti-allergic effects.

Allium sativum

The world widely uses garlic (*Allium sativum*), a root vegetable with a spicy taste, as a spice and flavoring.

Organosulfur compounds such as allicin and diallyl disulfide are the main compounds responsible for the spicy effect and spicy aroma.[17] Traditionally, garlic is known to have several biological activities, including anticarcinogenic, antioxidant, antidiabetic, renoprotective, anti-atherosclerotic, antibacterial, antifungal, and antihypertensive activities.[18,20] In vitro administration of *A. sativum* extract was reported to significantly inhibit the release of β-hexosaminidase with an IC_{50} of 1.53 mg/mL and inhibit TNF-α with an IC_{50} of 0.98 mg/mL.[21]

Solanum lycopersicum

Spread throughout the world, *Solanum lycopersicum* is a plant with special nutritional value, containing important nutrients such as lycopene, beta-carotene, flavonoids, vitamin C, and hydroxycinnamic acid derivatives.[22] Administration of *S. lycopersicum* extract containing naringenin chalcone (trans-2'4'6'4-tetrahydroxychalcone) in vitro was reported to significantly inhibit histamine release with an IC_{50} value of 68 µg/mL.[23]

Centella asiatica

Centella asiatica is a plant belonging to the *Apiaceae* family that is used as traditional medicine in several countries, including Indonesia. This plant is known to contain triterpenoids and saponins as the main elements which are believed to be responsible for its wide therapeutic action, such as healing wounds, leprosy, lupus, varicose ulcers, eczema, psoriasis, diarrhea, fever, amenorrhea, diseases of the genitourinary tract in women and also for relieve anxiety and improve cognition.[24] Researchers reported that giving water and alcohol extracts of *C. asiatica* leaves at a dose of 100 mg/kg each significantly inhibited mast cell degradation by 75-82% in mice induced by sheep serum.[25]

Psidium guajava

Psidium guajava, usually known as guava, is a medicinal plant that has been used traditionally for a long time in tropical countries, including Indonesia. *P. guajava* is a plant belonging to the *Myrtaceae* family that can be used as an anti-inflammatory, analgesic, anti-diabetic, anti-hypertensive, anti-microbial, antioxidant, antibacterial, and antitumor drug.[26,27] Administration of *P. guajava* extract at a concentration of 50 µg/mL in vitro was reported to inhibit degranulation and histamine release in antigen-induced and IgE-sensitized mast cells.[28]

Kaempferia parviflora

Kaempferia parviflora is an herbal plant known for its rhizomes, which are used in traditional medicine. *K. parviflora* rhizomes have a fragrant aroma and are used in various traditional medicines because they are reported to have anti-inflammatory, antimicrobial, and antioxidant properties.[29] In vitro administration of *K. parviflora* extract was reported to significantly inhibit antigen-induced release of β-hexosaminidase with an IC_{50} of 10.9 µg/mL.[1]

Moringa oleifera

Moringa oleifera is a plant belonging to the *Moringaceae* family that is traditionally used as anti-asthma, antidiabetic, hepatoprotective, anti-inflammatory, anti-fertility, anti-cancer, antimicrobial, antioxidant, cardiovascular, anti-ulcer, central nervous system activity, anti-allergy, wound healing, analgesic, and antipyretic.[30,31] In vitro administration of *M. oleifera* extract was reported to significantly inhibit mast cell degranulation by inhibiting the release of β-hexosaminidase and histamine with respective IC_{50} values of 7.17 µg/mL and 11.66 µg/mL.[32]

Ocimum basilicum

Ocimum basilicum is a species in the *Lamiaceae* family that is known for having various medicinal properties.[33] People have traditionally used this plant as an antimalarial, antirheumatic, anticholesterol, antihypertensive, painkiller, and for stroke treatment.[34,35] Administration of *O. basilicum* extract at doses of 0.75, 1.5, and 3 mg/mL was reported to significantly reduce IgE, IL-4, TNF-α, and IL-2 in a mouse model of ovalbumin-induced asthma.[36]

CONCLUSION

Indonesia is home to a diverse array of medicinal plants that possess promising attributes that could be harnessed to formulate alternative allergy treatments. Empirical and scientific studies have demonstrated that each of these plants can effectively reduce allergic reactions. The presence of active compounds in these plants, which possess anti-allergic properties through various mechanisms of action, renders this impossible to separate. There is optimism regarding the potential of medicinal plant research to advance allergy treatment and serve as a substitute for anti-allergy medications, which presently exhibit numerous hazardous side effects.

REFERENCES

1. Tewtrakul S, Subhadhirasakul S. Anti-allergic activity of some selected plants in the Zingiberaceae family. *J Ethnopharmacol*, 2007; 109(3): 535-538.
2. Bachert, C. The role of histamine in allergic disease: Re-appraisal of its inflammatory potential. *Allergy*, 2002; 57: 287-296.
3. Thangam EB, Jemima EA, Singh H, Baig MS, Khan M, Mathias CB, *et al*. The role of histamine and histamine receptors in mast cell-mediated allergy and inflammation: The hunt for new therapeutic targets. *Front Immunol*, 2018; 9: 1-9.
4. Eldanasory OA, Eljaaly K, Memish ZA, Al-Tawfiq JA. Histamine release theory and roles of antihistamine in the treatment of cytokines storm of COVID-19. *Travel Med Infect Dis*, 2020; 37: 1-2.
5. Guo RH, Park JU, Jo SJ, Ahn JH, Park JH, Yang JY, *et al*. Anti-allergic inflammatory effects of the essential oil from fruits of *Zanthoxylum coreanum Nakai*. *Front Pharmacol*, 2018; 9: 1-13.
6. Choi W, Lee HP, Manilack P, Saysavanh V, Lee BH, Lee S, *et al*. Antiallergic effects of *Callerya*

atropurpurea extract in vitro and in an in vivo atopic dermatitis model. *Plants (Basel)*, 2023; 12(4): 1-17.
7. Monczor F, Fernandez N. Current knowledge and perspectives on histamine H1 and H2 receptor pharmacology: Functional selectivity, receptor crosstalk, and repositioning of classic histaminergic ligands. *Mol Pharmacol*, 2016; 90(5): 640-648.
8. Alkandahri MY, PN Siahaan, Salim E, Fatimah C. AntiInflammatory activity of Cep-cepan leaves (*Castanopsis costata* (Blume) A.DC). *Int J Curr Med Sci*, 2018; 8(4A): 424-429.
9. Zulkarnaen P, Fadila N, Fadhilah LN, Kartika, Kardila K, Laely N, *et al*. Pharmacological activity of *Selaginella doederleinii* Hieron: An updated review. *Eur J Pharm Med Res*, 2024; 11(3): 17-20.
10. Nurhamidah W, Wijaya GD, Nurshazidah S, Zulfa AN, Chaerunnisa, Solihat S, *et al*. Anticoagulant activities of several active compounds from medicinal plants: A review. *Eur J Pharm Med Res*, 2024; 11(3): 13-16.
11. Alkandahri MY, Patala R, Berbudi A, Subarnas A. Antimalarial activity of curcumin and kaempferol using structure based drug design method. *J Adv Pharm Educ Res*, 2021; 11(4): 86-90.
12. Alkandahri MY, Arfania M, Abriyani E, Ridwanuloh D, Farhamzah, Fikayuniar L, *et al*. Evaluation of antioxidant and antipyretic effects of ethanolic extract of cep-cepan leaves (*Castanopsis costata* (Blume) A.DC). *J Adv Pharm Educ Res*, 2022; 12(3): 107-112.
13. Nuraeni E, Alkandahri MY, Tanuwidjaja SM, Fadhilah KN, Kurnia GS, Indah D, *et al*. Ethnopharmacological study of medicinal plants in the Rawamerta Region Karawang, West Java, Indonesia. *Open Access Maced J Med Sci*, 2022; 10(A): 1560-1564.
14. Alkandahri MY, Berbudi A, Utami NV, Subarnas A. Antimalarial activity of extract and fractions of *Castanopsis costata* (Blume) A.DC. *Avicenna J Phytomed*, 2019; 9(5): 474-481.
15. Alkandahri MY, Yuniarsih N, Berbudi A, Subarnas A. Antimalaria activities of several active compounds from medicinal plants. *Pharmacogn J*, 2022; 14(1): 245-252.
16. Rahma S, Rhena EP, Adindika EAP, Widiyani F, Zahira G, Saraswati GAPPD, *et al*. Medicinal plants for treatment of idiopathic thrombocytopenic purpura: A review. *Eur J Biomed Pharm Sci*, 2024; 11(3): 08-10.
17. Tesfaye A, Mengesha W. Traditional uses, phytochemistry and pharmacological properties of garlic (*Allium sativum*) and its biological active compounds. *Int J Sci Res Eng Technol*, 2015; 1: 142-148.
18. Rahman K, Lowe GM. Garlic and cardiovascular disease: a critical review. *J Nutr*, 2006; 136(3): 736S-740S.
19. Davis SR. An overview of the antifungal properties of allicin and its breakdown products--the possibility of a safe and effective antifungal prophylactic. *Mycoses*, 2005; 48(2): 95-100.
20. Badal DS, Dwivedi AK, Kumar V, Singh S, Prakash A, Verma S, *et al*. Effect of organic manures and inorganic fertilizers on growth, yield and its attributing traits in garlic (*Allium sativum* L.) *J Pharmacogn Phytochem*, 2019; 8: 587-590.
21. Yoo JM, Sok DE, Kim MR. Anti-allergic action of aged black garlic extract in RBL-2H3 cells and passive cutaneous anaphylaxis reaction in mice. *J Med Food*, 2014; 17(1): 92-102.
22. Kumar M, Tomar M, Bhuyan DJ, Punia S, Grasso S, Sá AGA, *et al*. Tomato (*Solanum lycopersicum* L.) seed: A review on bioactives and biomedical activities. *Biomed Pharmacother*, 2021; 142: 1-18.
23. Yamamoto T, Yoshimura M, Yamaguchi F, Kouchi T, Tsuji R, Saito M, *et al*. Anti-allergic activity of naringenin chalcone from a tomato skin extract. *Biosci Biotechnol Biochem*, 2004; 68(8): 1706-1711.
24. Gohil KJ, Patel JA, Gajjar AK. Pharmacological review on *Centella asiatica*: A potential herbal cure-all. *Indian J Pharm Sci*, 2010; 72(5): 546-556.
25. George M, Joseph L, Ramaswamy. Anti-allergic, anti-pruritic, and anti-inflammatory activities of Centella asiatica extracts. *Afr J Tradit Complement Altern Med*, 2009; 6(4): 554-559.
26. Irondi EA, Agboola SO, Oboh G, Boligon AA, Athayde ML, Shode FO. Guava leaves polyphenolics-rich extract inhibits vital enzymes implicated in gout and hypertension in vitro. *J Intercult Ethnopharmacol*, 2016; 5(2): 122-130.
27. Ugbogu EA, Emmanuel O, Uche ME, Dike ED, Okoro BC, Ibe C, *et al*. The ethnobotanical, phytochemistry and pharmacological activities of *Psidium guajava* L. *Arabian J Chem*, 2022; 15(5): 1-26.
28. Han EH, Hwang YP, Kim HG, Park JH, Choi JH, Im JH, et al. Ethyl acetate extract of *Psidium guajava* inhibits IgE-mediated allergic responses by blocking FcεRI signaling. *Food Chem Toxicol*, 2011; 49(1): 100-108.
29. Saokaew S, Wilairat P, Raktanyakan P, Dilokthornsakul P, Dhippayom T, Kongkaew C, *et al*. Clinical effects of Krachaidum (*Kaempferia parviflora*): A systematic review. *J Evid Based Complementary Altern Med*, 2017; 22(3): 413-428.
30. Paikra BK, Dhongade HKJ, Gidwani B. Phytochemistry and pharmacology of *Moringa oleifera Lam*. *J Pharmacopuncture*, 2017; 20(3): 194-200.
31. Andini DAP, Utami DSP, Puspawati I, Geralda AY, Apriani IP, Syalomita D, *et al*. Antidyslipidemic activity of some medicinal plants from Karawang, West Java, Indonesia: A review. *Eur J Pharm Med Res*, 2024; 11(3): 1-4.
32. Rani NZA, Kumolosasi E, Jasamai M, Jamal JA, Lam KW, Husain K. In vitro anti-allergic activity of Moringa oleifera Lam. extracts and their isolated

compounds. *BMC Complement Altern Med*, 2019; 19(1): 1-16.
33. Karpiński TM. Essential oils of *Lamiaceae* family plants as antifungals. *Biomolecules*, 2020; 10(1): 1-35.
34. Taek MM, Bambang PEW, Agil M. Plants used in traditional medicine for treatment of malaria by Tetun Ethnic people in West Timor Indonesia. *Asian Pac J Trop Med*, 2018; 11: 630-637.
35. Silalahi M, Nisyawati, Walujo EB, Supriatna J, Mangunwardoyo W. The local knowledge of medicinal plants trader and diversity of medicinal plants in the Kabanjahe Traditional Market, North Sumatra, Indonesia. *J Ethnopharmacol*, 2015; 175: 432-443.
36. Kamelnia E, Mohebbati R, Kamelnia R, El-Seedi HR, Boskabady MH. Anti-inflammatory, immunomodulatory and anti-oxidant effects of *Ocimum basilicum* L. and its main constituents: A review. *Iran J Basic Med Sci*, 2023; 26(6): 617-627.