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Evolvulus alsinoides: An Emerging Antibacterial Medicinal Herb

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Abstract

Nowadays, antibiotic resistance, a global problem is growing rapidly. Many existing antibiotics are associated with multidrug-resistant pathogens. Antibiotic resistance may lead to higher medical costs, and increased mortality. Many infectious diseases have been treated with several herbal drugs since ancient times. In previous studies, several medicinal plants showed promising antimicrobial activities. In this short commentary, we reviewed the antibacterial activity of *Evolvulus alsinoides*.

Keywords: Antibiotics; Infectious diseases; Anti-diabetics; Epilepsy

Introduction

Despite the recent advancements in antibiotics development still, infections are the primary cause of death worldwide, especially in developing countries. In a previous report it has been reported that worldwide approximately 700,000 people die due to infections that are resistant to current antibiotics, and by 2050, the number will be increased to 10 million per year [1]. In previous studies, it is well documented that efficiency of antibiotics is gradually more challenged by the emergence of pathogenic strains exhibiting high levels of resistance and several mechanisms are involved in antibiotic resistance [2-13]. Nowadays, scientists are trying to find some novel antimicrobial drugs which have broad-spectrum activity (including gram-negative and gram-positive bacteria) with or without minimal side effects. The researchers are exploring the variety of medicinal plants which are described in alternative system of medicines such as Ayurveda, an Indian system of medicine, a Chinese system of medicine for antibacterial activity. Therefore, there is urgent need of compounds/drugs to treat bacterial infections and prevent or delay the emergence of antibiotic resistance.

Out of several medicinal herbs (*Clitoria ternatea*, *Allium sativum*, *Allium cepa*, *Aloe vera*) with the antibacterial activity mentioned in Ayurveda, *Evolvulus alsinoides* is also well-known for the antibacterial activity. *Evolvulus alsinoides* (L), belonging to the family *Convolvulaceae*, is a small, hairy, procumbent, diffuse perennial herb with a small woody and branched rootstock [14]. Traditionally, this plant is being used for the treatment of fever, cough, cold, venereal diseases, bronchitis, biliousness, epilepsy, leucoderma, azoospermia, adenitis, dementia and used to promote to hair growth, improves the complexion and appetite [15-17]. Besides the traditional uses, this medicinal herb is also well-known for various pharmacological activities such as an antioxidant, anti-convulsant, anti-diabetic, nootropic and anxiolytic [18-21]. Additionally, hydroalcoholic extract of *Evolvulus alsinoides* ameliorated the streptozotocin-induced cognitive impairment in rats [22].

Antibacterial activity of *Evolvulus alsinoides*

The methanolic extract of *Evolvulus alsinoides* (150 µl/disc) leaf showed the broad-spectrum antibacterial activity against pathogenic bacterial strains (*Escherichia coli*, *Klebsiella pneumonia*, *Staphylococcus aureus*, *Pseudomonas aeuroginosa*) responsible for various common infectious diseases [23]. In another *in vitro* study, the ethanolic extract of the whole plant of *Evolvulus alsinoides* demonstrated the broad-spectrum antimicrobial activity against various pathogens including *Salmonella typhi*, *Klebsiella pneumonia*, *Bacillus cereus* and *Staphylococcus aureus*, *Pseudomonas*, *Proteus*, *Streptococus*, *Escherichia* [24,25].

Additionally, the ethanolic extract of the whole plant of *Evolvulus alsinoides* also showed the bactericidal activity against various clinical pathogens including *Staphylococcus aureus*, *Vibrio cholera*, *Salmonella para A*, *Salmonella para B* [26]. However, in another study, it was found that the ethanolic extract of *Evolvulus alsinoides* (whole plant) exhibited the antibacterial activity against *Pseudomonas aeruginosa* and *Escherichia coli* but found ineffective against *Staphyloccus aureus* and *Candida albicans* [27]. Furthermore, the methanolic extract of *Evolvulus alsinoides* leaf was found effective against gram-positive and gram-negative bacteria [28]. Furthermore, Saranya et al. investigated the antimicrobial activity of the methanolic extract of leaves, stem, root, and flowers of Evolvulus alsinoides using agar well diffusion method [29]. They found that root extract of Evolvulus alsinoides showed maximum antibacterial activity indicating the potential of this herb as an alternative treatment option against various resistant strains of bacteria [29]. Moreover, the aqueous and methanolic extract of the whole plant of *Evolvulus alsinoides* displayed strong antimicrobial activity against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae* and *Vibrio cholera* [30,31].

The flavonoid and alkaloids present in *Evolvulus alsinoide* may be responsible for the antimicrobial activity. The ethanolic and ethyl acetate of *Evolvulus alsinoides* leaves also showed the bactericidal activity in the previous study [32]. The ethanolic extract showed maximum bactericidal action against *Escherichia coli*, *Bacillus subtilis*, and *Pseudomonas aeruginosa* while the ethyl acetate extract indicated excellent growth inhibition against the *Bacillus subtilis* only [32]. Nonetheless, the aqueous extract of the whole plant of *Evolvulus*

alsinoides showed promising bactericidal activity against *Helicobacter pylori* which may be responsible for the gastroprotective effect of this medicinal herb [33].

Conclusion

The reports from earlier studies show the efficacy of *Evolvulus alsinoides* against both gram-positive and gram-negative bacteria. The broad-spectrum antimicrobial activity of *Evolvulus alsinoides* indicates the therapeutic potential for the treatment of various infectious diseases and supports the traditional use of this medicinal herb. Further clinical studies are required to validate the efficacy of this medicinal plant against various pathogens and various resistant strains of bacteria.

References

1. Brogan DM, Mossialos E (2016) A critical analysis of the review on antimicrobial resistance report and the infectious disease financing facility. Global Health 12: 8.
2. Chandra H, Bishnoi P, Yadav A, Patni B, Mishra AP, et al. (2017) Antimicrobial resistance and the alternative resources with special emphasis on plant-based antimicrobials: A review. Plants (Basel) 6: 16.
3. Mehla J, Sood SK (2011) Substantiation in *Enterococcus faecalis* of dose-dependent resistance and cross-resistance to pore-forming antimicrobial peptides by use of a polydiacetylene-based colorimetric assay. Appl Environ Microbiol 77: 786-793.
4. Mehla J, Sood SK (2013) Connecting membrane fluidity and surface charge to pore-forming antimicrobial peptides resistance by an ANN-based predictive model. Appl Microbiol Biotechnol 97: 4377-4384.
5. Sood SK, Vijay Simha B, Kumariya R, Garsa AK, Mehla J, et al. (2013) Highly specific culture-independent detection of ygngv motif-containing pediocin-producing strains. Probiotics Antimicrob Proteins 5: 37-42.
6. Downes MT, Mehla J, Ananthaswamy N, Wakschlag A, Lamonde M, et al. (2013) The transmission interface of the *Saccharomyces cerevisiae* multidrug transporter Pdr5: Val-656 located in intracellular loop 2 plays a major role in drug resistance. Antimicrob Agents Chemother 57: 1025-1034.
7. Furman C, Mehla J, Ananthaswamy N, Arya N, Kulesh B, et al. (2013) The deviant ATP-binding site of the multidrug efflux pump Pdr5 plays an active role in the transport cycle. J Biol Chem 288: 30420-30431.
8. Mehla J, Ernst R, Moore R, Wakschlag A, Marquis MK, et al. (2014) Evidence for a molecular diode-based mechanism in a multispecific ATP-binding cassette (ABC) exporter: SER-1368 as a gatekeeping residue in the yeast multidrug transporter Pdr5. J Biol Chem 289: 26597-26606.
9. Mehla J, Dedrick RM, Caufield JH, Siefring R, Mair M, et al. (2015a) The protein interactome of mycobacteriophage giles predicts functions for unknown proteins. J Bacteriol 197: 2508-2516.
10. Mehla J, Caufield JH, Uetz P (2015b) The yeast two-hybrid system: A tool for mapping protein-protein interactions. Cold Spring Harb Protoc 2015: 425-430.
11. Meena S, Mehla J, Kumar R, Sood SK (2016) Common mechanism of cross-resistance development in pathogenic bacteria *bacillus cereus* against alamethicin and pediocin involves alteration in lipid composition. Curr Microbiol 73: 534-541.
12. Mehla J, Dedrick RM, Caufield JH, Wagemans J, Sakhawalkar N, et al. (2017) Virus-host protein-protein interactions of *Mycobacteriophage giles*. Sci Rep 7: 16514.
13. Rodionova IA, Zhang Z, Mehla J, Goodacre N, Babu M, et al. (2017) The phosphocarrier protein HPr of the bacterial phosphotransferase system globally regulates energy metabolism by directly interacting with multiple enzymes in *Escherichia coli*. J Biol Chem 292: 14250-14257.
14. Austin DF (2008) *Evolvulus alsinoides* (Convolvulaceae). An American herb in the old world. J Ethnopharmacol 117: 185-198.
15. Kiritikar KR, Basu BD (1994) Indian Medicinal Plants. 2nd edn. Dehradun: 1738.
16. Sivarajan VV, Balachandran I (1994) Ayurvedic drugs and their plant sources, New Delhi: 522.
17. Asolkar LV, Kakkar KK, Chakre OJ (1992) Second supplement to glossary of indian medicinal plants with active principles, Part-I (A-K), Publications and Information Directorate, CSIR: New Delhi: 27.
18. Gomathi D, Ravikumar G, Kalaiselvi M, Devaki K, Uma C (2014) Antioxidant activity and functional group analysis of *Evolvulus alsinoides*. Chin J Nat Med 12: 827-832.
19. Abubakar K, Ugwah-Oguejiofor CJ, Usman MN, Abubakar SB, Abdulkadir R (2013) Evaluation of the anticonvulsant effect of the methanol extract of *Evolvulus alsinoides* in mice. Sch Acad J Pharm 2: 436-441.
20. Gomathi D, Ravikumar G, Kalaiselvi M, Devaki K, Uma C (2013) Efficacy of *Evolvulus alsinoides* L. on insulin and antioxidants activity in pancreas of streptozotocin induced diabetic rats. J Diabetes Metab Disord 12: 39.
21. Siripurapu KB, Gupta P, Bhatia G, Maurya R, Nath C, et al. (2005) Adaptogenic and anti-amnesic properties of *Evolvulus alsinoides* in rodents. Pharmacol Biochem Behav 81: 424-432.
22. Mehla J, Pahuja M, Dethe SM, Agarwal A, Gupta YK (2012) Amelioration of intracerebroventricular streptozotocin induced cognitive impairment by *Evolvulus alsinoides* in rats: *in vitro* and *in vivo* evidence. Neurochem Int 61: 1052-1064.
23. Gomathi RL, Elango V (2015) *In vitro* antimicrobial activity and phytochemical analysis of few indian medicinal plants. IJSR 4: 659-663.
24. Omogbai BA, Eze FA (2010) Preliminary phytochemical screening and susceptibility of bacteria pathogens to whole extract of *Evolvulus alsinoides* (L.). J Bio-Sci 18: 16-20.
25. Gomathi D, Kalaiselvi M, Ravikumar G, Devaki K, Uma C (2014). Mineral content analysis and investigation of antimicrobial activities of *Evolvulus alsinoides* (L.) against clinical pathogens. EI Med J 2: 93-96.
26. Dhanalekshmi UM, Poovi G, Kishore N, Raja MD, Reddy PN (2010) Evaluation of wound healing potential and antimicrobial activity of ethanolic extract of *Evolvulus alsinoides*. Annals of Biological Research 1: 49-61.
27. Dash GK, Suresh P, Sahu SK, Kar DM, Ganapaty S, et al. (2002) Evaluation of *Evolvulus alsinoides Linn* for anthelmintic and antimicrobial activities. Journal of Natural Remedies 2: 182-185.
28. Hussain AZ, Kumaresan S (2014) Phytochemical analysis and antimicrobial evaluation of *Evolvulus alsinoides L.* Der Chemica Sinica 5: 1-6.
29. Saranya B, Sarathadevi D, Somasundaram SSN (2015) Investigation of antibacterial activities of *Evolvulus alsinoides* (L.) against clinical pathogens. Int J Curr Microbiol App Sci 4: 491-497.
30. Saraswathy MP, Dhanalekshmi UM (2011) The effects of methanolic and aqueous extract of *Evolvulus alsinoides* on clinical isolates. J Pharm Biomed Sci 8: 1-3.
31. Moghadam NS, Anil Kumar HV, Laksmikanth R, Muralidhar N, Talkad S, et al. (2017) Anti-bacterial and anti-oxidant activities of *Evolvulus alsinoides Linn*. J Pharm Biol Sci 12: 83-86.
32. Priya T, Jeyakumar S (2017) Antimicrobial activity of *Evovulus alsinoids* extract with different organic solvents in pathogenic bacteria and fungal species. IJANS 6: 47-54.
33. Fernando SSN, Hewageegana HGSP, Ratnasooriya WD (2006) *In vitro* bactericidal activity of *Evolvulus alsinoides L.* against *Helicobacter pylori*. Aust J Med Herbalism 18: 110-112.