EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 9
Issue: 8
177-182
Year: 2022

A REVIEW ON ANTIBACTERIAL EFFICACY OF SOME TRADITIONAL MEDICINAL PLANTS

Soubhagya Ranjan Sahoo*[1], Khusboo Debnath[1], Jyoti Prada Sitha[1], Jimima Barla[1] and Liza Behera[1]

*[1,1]Department of Pharmacognosy, Jeypore College of Pharmacy, Jeypore, Odisha.

***Corresponding Author: Soubhagya Ranjan Sahoo**
Department of Pharmacognosy, Jeypore College of Pharmacy, Jeypore, Odisha.

Article Received on 19/05/2022 **Article Revised on 09/06/2022** **Article Accepted on 29/07/2022**

ABSTRACT
The beneficial medicinal effects of plant materials are frequently attributed to secondary products contained in the plant, rather than a single molecule. Plant therapeutic activities are unique to a specific plant species or group, which is compatible with the idea that the mix of secondary products in a specific plant is taxonomically distinct. The screening of plants usually comprises multiple approaches; ethno botanical approach is one of the major strategies used in selecting the plant for pharmacological inquiry. The antibacterial activities of numerous medicinal plants were examined in this review research. The current review focuses on the antibacterial activity of numerous medicinal herbs.

KEYWORDS: Taxonomically, Herbal Drugs, antibacterial activity, Ethno botanical, Therapeutic activities.

INTRODUCTION

Pharmaceuticals, cosmetics, and nutraceuticals are all incorporating medicinal plants. In the pharmaceutical industry, medicinal plants are largely used for the diverse variety of compounds found in plants that have been used to treat both chronic and infectious disorders. Long before civilization realised the existence of germs, it was widely accepted that certain plants had healing properties, that they contained what we now call antimicrobial principles. Plants have been utilised by humans to treat common infectious diseases, and some of these ancient medicines are still employed in the routine treatment of various ailments. Antimicrobial substances are abundant in medicinal plants.[1,2] As per World Health Organization (WHO), medicinal plants would be the best source for obtaining a variety of drugs, and 80 percent of the world population is dependent on traditional medicine, with plant extracts or their active constituents playing an important role in traditional therapies. However, scientific research into their antibacterial active chemicals is a relatively young topic.[3] Infectious diseases are widespread, particularly skin and mucosal infections. Fungi and bacteria are two key groups of skin infections.[4] Infectious dermatological disorders like as dermal inflammation, folliculitis, skin abuses, acne, dermatitis, rosacea, and others are frequent. Multidrug resistant microorganisms have been a significant reason of increased skin care product prices.[5] Due to the indiscriminate use of commercial antimicrobial medications routinely employed in the treatment of infectious disease, multiple drug resistance has evolved.[6] Immunocompromised people are frequently reported to have skin infections that are difficult to treat. A new chemical that differs from antibiotics in its method of action against germs offers an appealing alternative against multidrug resistant bacteria. Drugs already in use to treat infectious diseases are also a source of concern, as drug safety remains a major global problem. The majority of synthetic medications have negative side effects. Antimicrobial agents derived from promising plants should be investigated to address this issue. These plant-based medications are less toxic, have less adverse effects, and are less expensive. They are useful in the treatment of infectious disorders while reducing many of the negative effects associated with synthetic antimicrobials. Topical medication administration is a localised drug delivery strategy that can be used anywhere in the body via ophthalmic, rectal, vaginal, and cutaneous channels. The skin is the most accessible organ in the human body for topical administration and the primary route of the topical medication delivery system. A variety of medicinal treatments are applied to the skin or mucous membrane, either improving or restoring a fundamental function of the skin or pharmacologically altering an action in the highlighted tissues. These are known as topical or dermatological products. Drug molecules come into touch with cellular debris, bacteria, and other elements on the skin's surface, which causes penetration. The therapeutic chemical used has three routes to live tissue: 1) through hair follicles, 2) through sweat ducts, and 3) across the continuous stratum corneum between the appendages (hair follicles, sebaceous glands, eccrine, apocrine glands and nails). Because it avoids the first-

pass impact, gastrointestinal irritation, and metabolic degradation associated with oral administration, this mode of drug delivery has grown in favour. The topical route of administration has been used to create either a local effect for treating skin disorders or systemic medication effects.[7] Plant-based antimicrobials provide a massive untapped source of medications, and further research into plant antimicrobials is urgently needed. Plant-derived antimicrobials have significant therapeutic potential. Antimicrobials produced from plants have a long history of offering much-needed new treatments. Selected plants were extracted, formulated, and tested in vitro/in vivo.[8-11] Hundreds of plant species have been examined for antibacterial capabilities, however the majority have not been fully studied. Given the enormous potential of plants as sources of antimicrobial medicines, the current work is based on a review of such species. The antibacterial activity of the various plants is studied and summarised in table no.1.

Table 1: Details about plants having antibacterial activity.

SL. No	Name of the Plant	Part used for study	Extract used for study	Name of the Bactrias	Ref.
1	Beta vulgaris L Amaranthus graecizans Rumex obtusifolius Polygonum patulum	Aerial parts	Ethanolic extract	Pseudomonas aeruginosa Listeria monocytogenes Staphylococcus epidermidis Staphylococcus aureus Klebsiella pneumonia Salmonella typhi Bacillus cereus Bacillus anthracis	[12]
2	Aesculus indica Arisaema flavum Debregeasia salicifolia Pistacia integerrima Toona ciliate Carissa opaca	Leaves Rhizome Stem	Methanolic extract	Bacillus subtilis Staphylococcus aureus Micrococcus luteus Salmonella Setubal Pseudomonas pickettii	[13]
3	Seidenfia rheedii (Sw.) Szlach.	Leaves	Ethanolic extract	Bacillus cereus Shigella dysenteriae Sterptococcus faecalis	[14]
4	Sarcostemma iminale L. Eremophila longifolia Exocarpos aphyllus Eremophila sturtii Pimelea microcephala	Stem Leaves	Ethanolic extract	Bacillus cereus Enterococcus faecalis Staphylococcus aureus Streptococcus pyogenes Escherichia coli Klebsiella pneumoniae, Pseudomonas aeruginosa and Salmonella typhimurium	[15]
5	Allium sativum Caryophyllus aromaticus Zingiber officinale Psidium guajava Cymbopogon citratus Mikania glomerata	Bulbs Clove Flower buds Rhizomes Leaves	Methanolic extract	Escherichia coli, Salmonella Typhimurium, Staphylococcus aureus Enterococcus	[16]
6	R. officinalis Mentha	Leaves	Ethanol extract	Acinetobacter baumannii Klebsiella pneumoniae Escherichia coli Pseudomonas aeruginosa	[17]
7	Baccharis ligustrina Croton celtidifolius Cyathea phalerata	Leaves Stem	Ethanol extract	Staphylococcus aureus Escherichia coli	[18]
8	Woodfordia fruticosa Kurz	Flowers	Methanol extract	B. subtilis M. flavus P. mirabilis	[19]
9	Psidium guajava LINNAEUS	Leaves	Methanol extract	S. aureus E. coli Salmonella spp.	[20]
10	Asteraceae plants	Leaves	Methanol extract	Staphylococcus aureus, Enterococcus faecalis	[21]

				Pseudomonas aeruginosa Escherichia coli.	
11	Tovomita aff. Longifolia T. brasiliensis	Leaves	methanol: dichloromethane	Staphylococcus aureus Enterococcus faecalis	[22]
12	Salacia oblonga	Root	ethyl acetate extract	Staphylococcus aureus, Pseudomonas aeruginosa Klebsiella pneumoniae.	[23]
13	Argemone mexicana L.	leaves seeds	Methanol extract	Staphylococcus aureus Bacillus subtilis Esherichia coli Pseudomonas aeruginosa	[24]
14	Asteraceae & Rubiaceae plants	leaves seeds	Methanol extract	Bacillus subtilis Staphylococcus aureus	[25]
15	Dioscorea pentaphylla L	Tubers	methanol extract	Salmonella typhi Shigella flexneri Streptococcus pyogenes Streptococcus mutans Vibrio cholera	[26]
16	Acacia aroma	Aerial parts	organic and aqueous extracts	Staphylococcus aureus Staphylococcus epidermidis	[27]
17	T. kilimandscharica H. abyssinica	Bark Leaves	Methanolic extracts	Pseudomonas aeruginosa Escherichia coli Bacillus cereus Staphylococcus aureus	[28]
18	Aegle marmelos, Azadirachta indica, Terminalia chebula, Mangifera indica Ocimum sanctum	Leaves Fruit	Aqueous and ethanol	Staphylococcus aureus, Pseudomonas aeruginosa and Escherichia coli	[29]
19	Plectranthus ornatus Codd.	Aerial parts	dichloromethane extract	Staphylococcus aureus	[30]
20	Bidens pilosa Linné Annona crassiflora Mart	Aerial parts	Methanolic extracts	Staphylococcus aureus	[31]
21	Ocimum gratissimum L	Leaves	Methanolic extracts	Staphylococcus aureus Shigella flexineri Escherichia coli Klebsiella sp.	[32]
22	Annona muricata Linnaeus	Aerial parts		Staphylococcus aureus Escherichia coli.	[33]
23	Psidium guajava L	Leaves Roots Stem Bark	Aqueous and ethanol	Escherichia coli Pseudomonas aeruginosa	[34]
24	Polygonum orientale	Leaves Fruit		Clavibacter michiganensis subsp	[35]
25	Protium bahianum Protium heptaphyllum Muntingia calabur	Leaves Stem Flowers	Hexane and Ethanol extract	S. aureus B. subtilis	[36]
26	Zanthoxylum tingoassuiba	Roots Bark	Methanol extracts	Staphylococcus aureus	[37]
27	Achillea millifolium Caryophyllus aromaticus Melissa offficinalis Ocimun basilucum Psidium guajava Punica granatum Rosmarinus officinalis Salvia officinalis syzygyum Joabolanum thymus vulgaris	Flowers Fruit Leaves	Ethanol extract	Pseudomonas aeruginosa	[38]

28	J. officinale S. album B. ciliata B. ciliata	Roots Leaves Wood	Aqueous extracts	Staphylococcus aureus Bacillus subtilis Proteus vulgaris Pseudomonas aeruginosa Escherichia coli	[39]
29	INDONEESIELLA ECHIOIDES (L)	Aerial parts	Ethanol extract	Staphylococcus aureus Escherichia coli	[40]
30	Cassia tomentosa L. Cestrum auriculatum L Anredera diffusa Peperomia galioides HBK Krameria triandra R	Leaves Roots Stem	Methanolic extract	Staphylococcus aureus Escherichia coli	[41]
31	Hypericum roeperianum Cremaspora triflora, Heteromorphaarborescens, Pittosporum viridiflorum, Bolusanthus speciosus, Calpurnia aurea, Maesa lanceolata, Elaeodendron croceum	Leaves	Acetone extract	Staphylococcus aureus, Enterococcus faecalis Bacillus cereus Escherichia coli Salmonella Typhimurium Pseudomonas aeruginosa	[42]

CONCLUSION

Lastly, many research on the antimicrobial activity of herbal plant extracts revealed that various solvent extracts demonstrated promising antibacterial activity against bacterial and fungal human diseases. Various herbal researchers' findings also suggested that scientific studies on therapeutic plants with traditional efficacy claims could yield positive results. These plants may be a good source of novel antibacterial drugs.

ACKNOWLEDGMENT

The authors convey their thankfulness to the Management, Jeypore College of Pharmacy, Jeypore for providing their continuous support throughout the work. Mr. Saswat Kumar Rath and Mr. Rama Krushna Gouda are also to be thanked for their continued support and collaboration.

Data Availability

Not declared.

Conflict of Interest

The authors affirm that they have no conflict of interest. Funding Source No external funding declared.

REFERENCES

1. Ernest D, Kuppan E. A review on antimicrobial efficacy of some traditional medicinal plants in Tamilnadu. J. Acute Dis., 2013; 99-105.
2. Jindal A, Vashist H. Antimicrobial Activities of Medicinal Plants-Review. Int. j. res. pharm. biomed. sci., 2013; 3(1): 222- 30.
3. Parmar N, Rawat M. Medicinal plants used as antimicrobial agents: a review. Int. Res. J. Pharm., 2012; 3(1): 31-40.
4. Bhakshu L Md, Jeevan RA, Venkata R RR. In vitro antimicrobial activity of certain medicinal plants from Eastern Ghats, India, used for skin diseases. J Ethnopharmacol, 2004; 90: 350-57.
5. Harsulkar AM, Kuvalekar A, Pawar PK., Jagtap SD. Antimicrobial activity of some crude herbal drugs used for skin diseases by Pawra tribes of Nandurbar district. Indian J. Nat. Prod. Resour., 2009; 1(2): 216-20.
6. Jaitalkar DS, MV Kavitka R, Tambekar DH. Studies on antimicrobial potential of medicinal plants from lonar lake. Science Research Reporter, 2012; 2(3): 268-73.
7. Basha BN, Goli D, Prakasham K. Formulation and evaluation of a gel containing Fluconazole - Antifungal agent. Int. J. Drug Dev. & Res., 2011; 3(4): 109-28.
8. Mishra KM, Saragi B, Burala KK. Simultaneous Estimation of Sertraline and Alprazolam in its Bulk and Tablet Dosage Form by RP-HPLC Method. Asian Pacific Journal of Pharmacy and Phytochemistry, 2016; 1(1): 25-32.
9. Mishra KM, Prasanna KA, Behera SR. Simultaneous Estimation of Sacubitril and Valsartan in Bulk and Pharmaceutical Dosage Form by Using RPHPLC. Int. j. pharm. life sci., 2020; 1(2): 25-32.
10. Mishra KM, Behera SR, Mishra SR, Macha S, Burala KK. A Validated Stability Indicating RP-HPLC Method Development for Platelet Aggregation Inhibitor Ticagrelor in Bulk and Tablet Formulation. J. Glob. Pharma Technol, 2019; 11(12): 12-8.
11. Mishra KM, Burala KK, Kumari MM, Subrahmanyam BSS. New Analytical Method Development and Validation of Chlorpheniramine Maleate by Using Uv-Visible Spectrophotometry. Indo Am. j. pharm, 2016; 3(7): 767-72.
12. Koochak H, Seyyednejad SM, Motamedi H. Preliminary study on the antibacterial activity of some medicinal plants of Khuzestan (Iran). Asian Pac. J. Trop. Med., 2010; 180-84.
13. Bib Y, Nisa S, Chaudhary FM, Zia M. Antibacterial activity of some selected medicinal plants of

Pakistan. BMC Complement Altern. Med., 2011; 1-7.
14. Xavier TF, Senthilkumar S. An evaluation of antibacterial activities of Seidenfia rheedii (Sw.) Szlach. Afr. J. Biotechnol., 2009; 8(23): 6608-11.
15. Palombo EA, Semple SJ. Antibacterial activity of traditional Australian medicinal plants. J Ethnopharmacol, 2001; 77: 151– 57.
16. Ushimaru PI, da Silva MTN, Stasi LCD, Barbosa L, Junior AF. Antibacterial Activity of Medicinal Plant Extracts. Braz. J. Microbiol., 2007; 38: 717-19.
17. Assis FVD, Siqueira FL, Gonçalves IE, Lacerda RP, Nascimento RA, Araújo SG, Andrade JT, Herrera KMS, Lima LARS, Ferreira JMS. Antibacterial activity of Lamiaceae plant extracts in clinical isolates of multidrug-resistant bacteria. Anais da Academia Brasileira de Ciências, 2018; 90(2): 1665-70.
18. Valgas C, De Souza SM, Smânia EFA, Smânia A. Screening Methods to Determine Antibacterial Activity of Natural Products. Braz. J. Microbiol., 2007; 38: 369-80.
19. Parekh J, Chanda S. In vitro antibacterial activity of the crude methanol extract of woodfordia fruticosa kurz. Flower (lythraceae). Braz. J. Microbiol., 2007; 38: 204-7.
20. Gonçalves FA, Neto MA, Bezerra JNS, Macrae AN, De Sousa OV, Filho AA, Vieira RHSF. Antibacterial Activity of Guava, Psidium Guajava Linnaeus, Leaf Extracts on Diarrhea-Causing Enteric Bacteria Isolated from Seabob Shrimp, Xiphopenaeus kroyeri (HELLER). Rev. Inst. Med. trop. S. Paulo, 2008; 50(1): 11-15.
21. Suffredini IB, Sader HS, Gonçalves AG, Reis AO, Gales AC, Varella AD, Younes RN. Screening of antibacterial extracts from plants native to the Brazilian Amazon Rain Forest and Atlantic Forest. Braz. J. Med. Biol. Res., 2004; 37: 379-84.
22. Suffredini IB, Paciencia MLB, Nepomuceno DC, Younes RN, Varella AD. Antibacterial and cytotoxic activity of Brazilian plant extracts – Clusiaceae, Mem Inst Oswaldo Cruz. Rio de Janeiro, 2006; 101(3): 287-90.
23. Musini A, Giri A. Investigation of Mode of Action of Anti Bacterial Activity of Salacia Oblonga Extract Against Drug Resistant Pathogen. Braz Arch Biol Technol., 2019; 62: 1-10.
24. Bhattacharjee I, Chatterjee SK, Chatterjee S, Chandra G. Antibacterial potentiality of Argemone mexicana solvent extracts against some pathogenic bacteria. Mem Inst Oswaldo Cruz, Rio de Janeiro, 2006; 101(6): 645-48.
25. Niño J, Narváez DM, Mosquera OM, Correa YM. Antibacterial, Antifungal and Cytotoxic Activities of Eight Asteraceae and Two Rubiaceae Plants from Colombian Biodiversity. Braz. J. Microbiol., 2006; 37: 566-70.
26. Kumar S, Mahanti P, Singh NR, Rath SK, Jena PK, Patra JK. Antioxidant activity, antibacterial potential and characterization of active fraction of Dioscorea pentaphylla L. tuber extract collected from Similipal Biosphere Reserve, Odisha, India. Brazilian J. Pharm. Sci. BRAZ J PHARM SCI, 2017; 53(4): 1-10.
27. Mattana C.M, Satorres SE, Sosa A, Fusco M, Alcaráz LE, Antibacterial Activity of Extracts of Acacia Aroma Against Methicillin-Resistant and Methicillin-Sensitive Staphylococcus. Braz. J. Microbiol., 2010; 41: 581-87.
28. Cyrus WG, Daniel GW, Nanyingi MO, Njonge FK, Mbaria JM. Antibacterial and cytotoxic activity of Kenyan medicinal plants. Mem Inst Oswaldo Cruz, Rio de Janeiro, 2008; 103(7): 650-52.
29. Chattopadhyay RR, Bhattacharyya SK, Medda C, Chanda S, Bag A. A Comparative Evaluation of Antibacterial Potential of Some Plants Used in Indian Traditional Medicine for the Treatment of Microbial Infections. Braz Arch Biol Technol, 2009; 52(5): 1123-28.
30. Nascimento FR, Albuquerque KRS, Oliveira MR, Pizziolo VR, Brasileiro BG, Diaz G, Diaz MAN. Antibiotic activity of Plectranthus ornatus Codd, a Traditional Medicinal Plant. Anais da Academia Brasileira de Ciências, 2017; 89(3).
31. Silva JJD, Cerdeira CD, Chavasco JM, Cintra ABP, Silva CBPD, Mendonça AND, Ishikawa T, Boriollo MFG, Chavasco JK. In vitro Screening Antibacterial Activity of Bidens pilosa Linné and Annona crassiflora Mart. Against Oxacillin Resistant Staphylococcus aureus (ORSA) from the Aerial Environment at the Dental Clinic. Rev. Inst. Med. Trop. Sao Paulo, 2014; 56(4): 333-40.
32. Nakamura CV, Nakamura TU, Bando E, Melo AFN, Cortez DAG, Filho BPD. Antibacterial Activity of Ocimum gratissimum L. Essential Oil. Mem Inst Oswaldo Cruz, Rio de Janeiro, 1999; 94(5): 675-78.
33. Silva RMD, Silva IDMM, Estevinho MM, Estevinho LM. Anti-bacterial activity of Annona muricata Linnaeus extracts: a systematic review. Food Sci. Technol., 2021; 1-10.
34. Sanches NR, Cortez DAG, Schiavini MS, Nakamur CV, Filho BPD. An Evaluation of Antibacterial Activities of Psidium guajava (L.). Braz Arch Biol Technol, 2005; 48(3): 429-36.
35. Gao JCY, Zhang MWJ, Wang YZQ, Liu J. Antibacterial Activity of Polygonum Orientale Extracts Against Clavibacter Michiganensis subsp. Michiganensis. The Agent of Bacterial Canker of Tomato Disease, 2019; 62.
36. Ramos SCS, Oliveira JCSD, Câmara CAGD, Carvalho ICAFFU, Filho JVL. Antibacterial and cytotoxic properties of some plant crude extracts used in Northeastern folk medicine. Revista Brasileira de Farmacognosia Brazilian Journal of Pharmacognosy, 2009; 19(2A): 376-81.
37. Costaa RS, Lins MO, Hyaricc ML, Barros TF, Velozoa ES. In vitro antibacterial effects of Zanthoxylum tingoassuiba root bark extracts and two of its alkaloids against multiresistant

Staphylococcus aureus. Revista Brasileira de Farmacognosia, 2017; 27: 195–98.
38. Nascimento GGF, Locatelli J, Freitas PC, Silva GL. Antibacterial Activity of Plant Extracts and Phytochemicals on Antibioticresistant Bacteria. Braz. J. Microbiol., 2000; 31: 247-56.
39. Khan UA, Rahman H, Niaz Z, Qasim M, Khan J, Rehman B. Antibacterial Activity of Some Medicinal Plants Against Selected Human Pathogenic Bacteria. Eur. J. Microbiol. Immunol., 2013; 3(4): 272–74.
40. Qadrie ZL, Anandan BJR, Kapoor BR, Ulla MR. Anti-bacterial activity of ethanolic extract of indoneesiella echioides (l) nees. Evaluated by the filter paper disc method, Pak. J. Pharm. Sci, 2009; 22(2): 123-25.
41. Neto CC, Owens CW, Langfield RD, Comeau AB, Onge JS, Vaisberg AJ, Hammond GB. Antibacterial activity of some Peruvian medicinal plants from the Callejon de Huaylas. J Ethnopharmacol, 2002; 79: 133– 38.
42. Elisha IL, Botha FS, McGaw1 LJ, Eloff JN. The antibacterial activity of extracts of nine plant species with good activity against Escherichia coli against five other bacteria and cytotoxicity of extracts. BMC Complement Altern. Med., 2017; 17: 133.