P: ISSN No. 2231-0045 RNI No. UPBIL/2012/55438 VOL.-7, ISSUE-2, November-2018
E: ISSN No. 2349-9435 Periodic Research

Antimicrobial Activity of Some Indian Medicinal Plants

Ashish Mishra
Research Scholar,
Deptt.of Chemistry,
Gandhi Faiz-e-Aam College,
Shahjahanpur, U.P.

Mohsin Hasan Khan
Associate Professor,
Deptt.of Chemistry,
Gandhi Faiz-e-Aam College,
Shahjahanpur, U.P.

Abstract

Ethnopharmacology has contributed to the discovery of many important plant-derived drugs. Four different plant extracts were tested for antimicrobial activity in vitro, using well diffusion method. Benzene extract of *S. aromaticum* (100µl) showed highest antimicrobial activity (19mm) against *P. aeruginosa.* All extracts of all four plants showed moderate activity against *E. coli* and *E. aerogenes. C.* sativum and *C. longa* were not effective against any pathogen. In future, these plants can be further subjected to isolation of the therapeutic antimicrobials for health purposes as medicine.

Keywords: Agar Well Diffusion, Medicinal Plants, *P. Aeruginosa, S. Aromaticum.*

Introduction

Ethnopharmacology has contributed to the discovery of many important plant-derived drugs (Singh et al., 2011, Sofowora, 1996). Since prehistoric times man has used plants for various purposes and he will continue to do so as long as life continues on this planet. Even in an age of substitute man-made materials, plants and plant products are still in great demand. Plants purify the air we breathe and serve as food for both man and beast; they are a source of fuel for cooking, lighting, heating and provide materials for building and construction (Martino et al., 2002). In the present work, 4 different medicinal plants belonging to different families were evaluated for their antibacterial properties.

Review of Literature

In recent years usage of commercial anti-microbial drugs against human pathogenic microorganisms increased extensively. Numerous studies have been carried out on various natural products screening their antimicrobial activity. Effective antimicrobials have been developed over the past years, several reports development of antibiotic resistance of human pathogens to available antibiotics (Martino et al., 2002).Due to the cost effectiveness, safety, increasing failure of chemotherapy and antibiotic resistance, search for plant resources has been increased for their potential antimicrobial activity (Hammer et al., 1999). Kaur et al., 2017, Yadav et al., 2018 and Yadav., 2018 tested the antimicrobial activity of plants and showed that plants are a potential source of innovative antibiotic prototype.

Objective of the study

The present investigation was performed to study the antimicrobial potential of four Indian medicinal plants against four pathogens.

Methodology

Materials and Methods

Plant Material

S.No.	Plant	Material
1	*Foeniculum vulgare*	Fruit
2	*Syzygium aromaticum*	Buds
3	*Coriandrum sativum*	Fruit
4	*Curcuma longa*	Rhizome

Bacterial Cultures

The microorganisms used were *Staphylococcus aureus* (NCIM-2079), *Enterobacter aerogenes* (NCIM-2695), *Escherichia coli* (NCIM-2064), and *Pseudomonas aeruginosa* (NCIM-5210).

Solvents and Media

Acetone, Benzene and Methanol solvents for extraction, Nutrient Agar.

Preparation of Extract

10 gms of powder was ground finely and made in to an extraction packet. The packet was inserted in to the Soxhlet apparatus which fixed in to the round bottom flask containing 100 ml of solvent. The warm mixture was stirred and filtered after distillation for 3 hours. After the complete process, the collected extracts were subjected for evaporation at room temperature. The dried extracts were stored at 4˚C for future analysis.

Agar Well Diffusion Assay

The agar well diffusion assay was employed with modifications as described by Irshad et al., 2012. Initially, autoclaved nutrient media were poured in the Petri plates under laminar air flow and after solidification of media the bacterial suspension (24 hrs old) swab over the media. The wells were prepared using cork borer. Test sample was dissolved in DMSO in different concentrations such as 25, 50, 100 µg/ml and 40 µl dissolved test sample from each concentration was loaded to the wells and incubated for 24 hrs at 37ºC. DMSO (Di Methyl Sulfoxide) used as a negative control whereas antibiotic amoxicillin disc having amoxicillin 10µg concentration used as positive control.

Table 1: Effect of Plant Extract on growth of bacteria *in vitro*

Bacteria	Plant Material	Dilution of Plant Extracts(µl/ml)								
		Benzene			Methanol			Acetone		
		25	50	100	25	50	100	25	50	100
		Zone of Inhibition								
Staphylococcus aureus										
	Foeniculum vulgare	5	15	18	-	-	12	3	13	16
	Syzygium aromaticum	5	14	17	3	11	14	5	14	17
	Coriandrum sativum	-	-	9	-	-	8	-	-	10
	Curcuma longa	-	-	8	-	-	7	-	-	9
Pseudomonas aeruginosa										
	Foeniculum vulgare	6	16	18	4	7	13	5	14	18
	Syzygium aromaticum	6	15	19	3	11	14	5	15	17
	Coriandrum sativum	-	-	8	-	-	7	-	-	9
	Curcuma longa	-	-	8	-	-	8	-	-	9
Escherichia coli										
	Foeniculum vulgare	-	-	8	-	-	12	-	-	11
	Syzygium aromaticum	-	-	10	-	-	11	-	-	11
	Coriandrum sativum	-	-	9	-	-	8	-	-	10
	Curcuma longa	-	-	8	-	-	7	-	-	9
Enterobacter aerogenes										
	Foeniculum vulgare	5	14	16	-	-	12	3	11	15
	Syzygium aromaticum	5	13	16	-	-	14	5	11	13
	Coriandrum sativum	-	-	8	-	-	7	-	-	9
	Curcuma longa	-	-	8	-	-	7	-	-	8

Discussion and Results

The result obtained for the antimicrobial test performed on different extract of medicinal plants and zone of inhibition of the individual plant extract with four type of bacterial pathogen are shown in (Table 1). Benzene extract of *S. aromaticum* (100µl) showed highest antimicrobial activity (19mm) against *P. aeruginosa.* 100 µl benzene and acetone extract of *S. aromaticum* showed 17mm zone of inhibition against *P. aeruginosa.* 100 µl benzene and acetone extract of *F. vulgare* showed good antimicrobial activity (18mm) against *P. aeruginosa.* As the dilution decreases the antimicrobial activity also decreases. 100 µl benzene extract of *F. vulgare* also showed good result (18mm) against *S. aureus*. All extracts of all four plants showed moderate activity against *E. coli* and *E. aerogenes. C. sativum* and *C. longa* were not effective against any pathogen.

Conclusion

These findings concludes that many Indian medicinal plants can be used against the pathogenic bacteria. So, there is a clear need for exploration of new antimicrobial agents with novel mode of action from plant sources and to study the potentiality for applications in food systems. Further research is also necessary to use the phytochemicals as medicine.

References

1. *Singh, V. Birendra, V.K. Vishal S.(2011). "A Review on Ethnomedical uses of Ocimum sanctum (Tulsi)." International Journal of Pharmacy. 2 (10):1- 3.*
2. *Sofowora, A. (1996). "Research on Medicinal Plants and Traditional Medicine in Africa." Journal of Alternative and Complimentary Medicine. 2(3):365-372.*
3. *Anon, J.W. The Research for New Drugs from Natural Sources In: Wani M.S., (2005), Antibiotic Study of Medicinal Plants, www.pharmainfo.net.*
4. *Martino, P.D. Gagniere, H. Berry, H. Bret L. (2002).Microbes and infection. 613-620.*
5. *Hammer, K .A. Carson, C.F. Riley, T.V. (1999). "Atimicrobial activity of essential oils and other plant extract." Journal of applied microbiology. 86: 985-990.*
6. *Kaur, S. Fatima, N and Yadav, S. (2017). "Antibacterial Activity of Different Extracts of Black Pepper." Int. J. Adv. Eng. Sci., 2(1): 172-173.*
7. *Yadav, S. Gupta, P. and Rastogi, D. (2018). "Antibacterial Activity of Aegle Marmelos Leaf Extracts." Int. J. Cre. Res. Tho., 6(2): 879-881.*
8. *Yadav, S. (2018). "Antibacterial Activity of Garlic." Int. J. Bas. Adv. Res., 4(5): 156-159.*
9. *Nag, S. Paul, A. and Dutta, R. (2012). "Phytochemical analysis of methanolic extracts of leaves of some medicinal plants." Int. J. Sci. Res. Publ., 3(4): 1-5.*