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RESEARCH ARTICLE

Antimicrobial Activity of Two Indian Medicinal Plants against Pathogenic Bacteria

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ABSTRACT

The present study was aimed to evaluate the antimicrobial activity of ethanol and ethyl acetate extract of indian medicinal plants *Allium sativum* and *Ocimum sanctum* against pathogenic bacteria. *Allium sativum* and *Ocimum sanctum* are daily used plants in India and native to Asia and Africa. The plant leaves were collected, shade dried, powdered and extracted in respective solvent. Antimicrobial activity of plant extract was conducted using agar disc diffusion method. The results of the present study indicate that both plants showed promising antimicrobial activity against pathogenic bacteria. It can be recommended that *Allium sativum* and *Ocimum sanctum* can be used as natural antimicrobial agent without any side effect.

Keywords: *Allium sativum*, *Ocimum santum,* Indian medicinal plants, Disc Diffusion, pathogenic, natural antimicrobial agent.

INTRODUCTION

Human beings have been utilizing plants for thousands of years for basic preventive folk medicine. Herbal medicines are being utilized in Ayurveda, Sidha, Unani and Homeopathy for their effective treatment (Dubey et al. 2011). Medicinal plants have been reported to have pharmacological properties. Since antiquity, many plants species reported to have pharmacological properties as they are known Pharmacological activity of plant is due to presence of some secondary metabolites like phenolic compounds, glycosides, saponins, flavonoids, steroids, tannins, alkaloids and terpenes (Lalitha *et al.* 2010; Khan and Bhadauria, 2017).

Microbial infection is common health problem all around the world. Development in science and technology has remarkable progress in the production of many synthetic drugs like antibiotics (Preethi*et al.* 2010). Antibiotics are produced from microbial origin. With the indiscriminate use of antibiotics for treatment of infection, antibiotic sensitivity may be developed in body. Antibiotic resistance has increased considerably in recent years. From the last few years, herbal medicines are being utilized as the solution of antibiotic resistance problem (Alagesaboopathi 2011). Medicinal plants have variety of pharmaceutical effects against pathogen and they can be used regularly without generating antibiotic resistance. Medicinal plants are being used for the treatment of many human disease as tradition medicine. Traditional use of medicinal plants has been used for anticancer, antiulcer, antioxidant and antidiabetic activity (Pankaj and Kaushik, 2011). Some medicinally plants are specifically used for anti-parasitic, antifungal, antimalarial and insecticide activity (Acharyya *et al.* 2011). The present study is aimed for antimicrobial activity of selected plant extract against some pathogenic bacteria.

MATERIALS AND METHODS

Plant material

In this study, two plants were selected for antimicrobial activity- *Allium sativum* and *Ocimum sanctum.*The plant leaves were collected from agriculture farms of Jaipur, Rajasthan and submitted to herbarium for Identification. The collected plant materials were washed thoroughly with running tap water to remove the surface contaminants and then dried under room temperature.After drying plant materials were finely powdered using mixer grinder and stored for further use.

Preparation of the plant extracts

The shade dried powder (50 gm) was used for the extracted in different solvents like Ethyl acetate and 80% Ethanolin Soxhlet extraction unit. All the extracts were evaporated by heating on water bath. Extracts of each plant materials were collected in sterile screw capped vials.

Antimicrobial activity of plant extract

The antimicrobial efficacy of plant extracts was evaluated against selected bacteria.The antimicrobial efficiency of plant extract of the *Allium sativum* and *Ocimum sanctum* was assessed against some pathogenic bacteria. For this, autoclaved Whatman filter paper discs were used and dipped in each plant extract separately for 24 hours for complete absorption of plant extraction**.**

Antimicrobial screening of plant extract

The antimicrobial activity of plant extract of the *Allium sativum* and *Ocimum sanctum* was evaluated using modified agar disc diffusion method as described by Gould and Bowie (1952) and Bauer and Kirby (1966). Antimicrobial susceptibility was tested on solid nutrient agar media plates. Prepared nutrient agar media was poured separately into Petri plates and allowed to solidify. Test cultures were inoculated onto agar media surface using sterile cotton swabs. Immediately after inoculation, plant extracts were placed on the surface of media plates separately. The plates were incubated at 37^0C for 24 hours. All the analysis of each test were made in triplicates for the calculation of standard error.

RESULTS AND DISCUSSION

In the present investigation, antibacterial activity of plant extracts of *Allium sativum* and *Ocimum sanctum* were evaluated against bacterial strains. The antimicrobial activity was determined using agar well diffusion method. Antibacterial activity of plant extracts was analyzed on the basis of zone of inhibition and their activity index. The results revealed that all the extracts are potent antimicrobials against all the microorganisms studied. From the two solvents extracts studied Ethyl acetate extract showed high degree of inhibition than Ethanol extract.

In Ethyl acetate extract of *Allium sativum* showed maximum inhibition zone with diameter of 19 ± 0.351 mm in *E. coli* and 17 ± 0.3 mm in *S.aureus*. The Ethanolic extract of garlic extract showed effective zone of inhibition for *E.coli* (17 ± 0.057mm) and *S.aureus* (15 ± 0.23 mm) respectively. *Ocimum sanctum* Ethyl acetate extract also exhibited promising zone of inhibition against *E. coli* (17 ± 0.057mm)and *S.aureus* (15 ± 0.23 mm). Similarly, Ethanol extract of *Ocimum sanctum* showed zone of inhibition of 14 ± 0.43 mm against *E.coli* and 11 ± 0.24 mm against *S. aureus.* In the present study, Antibacterial activity of different *Ocimum sanctum* and *Allium sativum* extracts against *E. coli* and *Staphylococcus aureus* were studied (Mittal*et al.* 2018).According to the results, of different *Ocimum sanctum* and *Allium sativum* extracts antibacterial activity against tested microbial pathogens (Rajesh *et al.* 2018). *Allium sativum* showed more antibacterial activity than *Ocimum sanctum*. Highest antibacterial activity was shown by *Allium sativum* ethyl acetate extracts against bot tested bacteria.

CONCLUSION

From the present study, it can be concluded that plant based herbal drugs can be developed which are similarly effective as synthetic drugs without any side effects.Commercial available drugs cannot be used regularly because body may develop antibiotic resistance against the drugs.The present study clearly indicates that *Allium sativum* and *Ocimum sanctum* contain potent antimicrobial properties and are easily available in India. From the present study, indian medicinal plants can be recommended as daily use antimicrobial agent against pathogenic micro-organisms with low cost and fewer side effects.

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Table 1: Antibacterial activity of different plant extracts of *Allium sativum* and *Ocimum sanctum*

S. No.	Plant extract	Microorganism	Zone of inhibition in mm		Zone of inhibition Chloramphenicol (10µg/ml)
			Ethyl acetate extract	Ethanol extract	
1	*Allium sativum*	*S. aureus*	17 ± 0.3	15 ± 0.23	21 ± 0.23
2	*Allium sativum*	*E.coli*	19 ± 0.351	17 ± 0.057	24 ± 0.18
3	*Ocimum sanctum*	*S.aureus*	13 ± 0.61	11 ± 0.24	21 ± 0.23
4	*Ocimum sanctum*	*E.coli*	15 ± 0.13	14 ± 0.43	24 ± 0.18

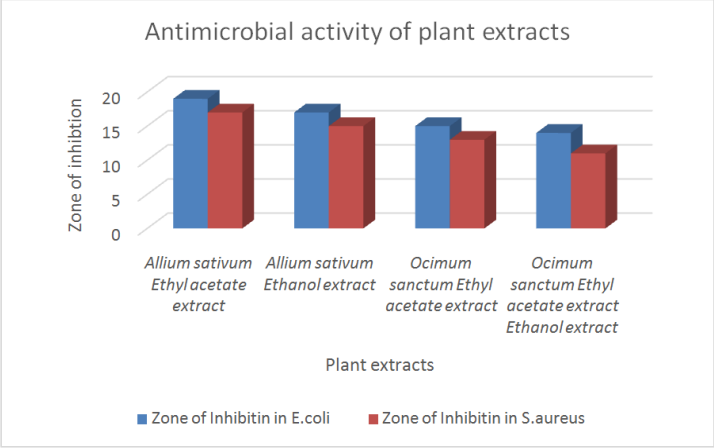

Figure 1: **Antifungal activity of plant extracts**