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Research Article

Antibacterial activity of some selected medicinal plants

■ P. PREMAMALINI

P.G. and Research Department of Botany, Vellalar College for Women, ERODE (T.N.) INDIA

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ABSTRACT

The present study was carried out to evaluate the antibacterial nature of leaf and root extracts of *Abutilon indium, Datura metal, Solanum nigrum* and *Trigonella foenum-graecum* against gram positive bacteria such as *Streptococcus pyogenes, Staphylococcus aureus, Enterococcus* sp. and *Bacillus cereus*. The antibacterial activity was carried out in aqueous and methanolic extracts of all the tested plants. Among the extracts tested, methanolic extracts of all the tested plants were comparably more effective to inhibit the growth of bacteria than the aqueous extracts.

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INTRODUCTION

The history of herbal medicines is as old as human civilization. For the sustenance and survival, man has to depend on nature. Demand for medicinal plants is increasing in all countries due to growing recognition of natural products, being non-narcotic, having no side effects, easily available at affordable prices and sometimes the only source of health care available to the poor. India has a treasure of medicinal plants and a number of herbs are traditionally used for the treatment of many diseases. In recent years, there has been a phenomenal rise in the interest of scientific community to explore the pharmacological activities of medicinal plants (Chah *et al*., 2006). Angiosperms are reported to have a reservoir of effective therapeutants and constitute an inexhaustible source of harmless protectants (Grainge and Alvarez, 1987). Even parasitic plants and orchids also are of great medicinal value, which are found to be antimicrobial (Kaushik and Dhiman, 1995). The use of plant extracts and phytochemicals both with known antimicrobial properties, can be of great significance in therapeutic treatments (Gehlot and Bohra, 1998). According to World Health Organization (WHO) medicinal plants would be the best source to obtain a variety of drugs. Many plants have been used because of their antimicrobial traits, which are due to compounds synthesized in the secondary metabolism of the plants (Kaushik, 2003).

Considering the rich diversity of medicinal plants, it is expected that screening and scientific evaluation of plant extracts for their antibicrobial substance may prove beneficial interaction among crude extracts or phytoconstituents *in vitro* may be useful in the preparation of improved polyherbal or drugs formulations. In the present investigation, an attempt has been made to test *in vitro* antibacterial activity of leaf and root extracts of *Abutilon indium, Datura metal*, *Solanum nigrum* and *Trigonella foenum-graecum* against the growth of human and plant pathogenic bacteria *Streptococcus pyogenes*, *Staphylococcus aureus, Enterococcus* sp. and *Bacillus cereus.*

MATERIALS AND METHODS

Collection and identification of plants:

The plants were collected and identified by using monograph on floras and authenticated by Botanical Survey of India, Southern Circle, Coimbatore, Tamil Nadu, India and confirmed through literature available in the Department of Botany, Vellalar College for Women, Erode, Tamil Nadu.

Preparation of plant extracts:

Twenty g of fresh plants were washed and shade dried, pulverized and sieved. The dried powder of leaves and roots were then subjected to extraction with water and methanol separately in Soxhlet apparatus. The collected extracts obtained were condensed by evaporation under room temperature and the extracts were used for further investigation.

Table 1 : Inhibitory activity of some selected medicinal plants on the growth of test organisms

Sr. No.	Plant species	Extract	Diameter of zone of inhibition (in mm)							
			Streptococcus pyogenes		*Staphylococcus aureus*		*Entrococcus* sp.		*Bacillus cereus*	
			Leaf	Root	Leaf	Root	Leaf	Root	Leaf	Root
1.	*Abutilon indium*	Aqueous	09	04	08	02	04	06	02	07
		Methanol	10	07	13	07	06	13	08	10
2.	*Datura metal*	Aqueous	05	03	09	0	05	07	07	04
		Methanol	06	08	11	06	13	09	09	05
3.	*Solanum nigrum*	Aqueous	0	02	09	02	04	06	06	03
		Methanol	08	04	10	08	06	12	10	07
4.	*Trigonella*	Aqueous	02	04	09	04	07	05	02	03
	foenum-graecum	Methanol	09	06	12	07	09	13	08	07

Antibacterial activity of plant extracts:

Bacterial cultures used in this study were obtained from the Institute of Microbial Technology (MTECH), Chandigarh, India and maintained on a nutrient agar slant. The inoculum was used for antibacterial assay. Agar well diffusion method (Bauer *et al*., 1996) was used for testing the antibacterial activity. The media (17 ml) inoculated with suspension of experimental organisms were poured into sterilized Petri dishes and allow to solidification at room temperature. Wells of 5 mm. in diameter and about 2 cm. apart were punctured in the culture media using sterile cork borers. About 0.2.ml. of aqueous and methanolic extracts were added to the wells separately. Plates were incubated at 28^0C for 24 hours. Antibacterial activities were recorded in terms of growth inhibiting zones (in mm).

RESULTS AND DISCUSSION

Table 1 shows the antibacterial activity of leaf and root extracts of plants undertaken for investigation. During investigation, it has been found that methanolic extracts of leaf and root have shown inhibition against the tested bacteria, aqueous leaf and root extracts have also shown zones of inhibition in some extent except aqueous leaf extract of *Solanum nigrum* and root extracts of *Datura metal* against *Streptococcus pyogenes* and *Staphylococcus aureus,* respectively. This may be due to methanolic extracts of plants which are better than aqueous extracts for the treatment of bacterial infections and the constituents which are responsible for the antibacterial activity that may be dissolved only by means of methanol. Similar results have been observed by Essawi and Srour (2000). They reported that organic extracts exhibited better antibacterial activity than aqueous extracts and may be due to the antibacterial principles which are either polar or non-polar and effectively extracted only through the organic solvent medium.

In *Streptococcus pyogenes*, zones of inhibition observed from methanolic leaf and root extracts of species plants have been found to be higher than aqueous extracts but no zones of inhibition was observed from aqueous leaf extract of *Solanum nigrum*. The organism was found to be total resistant against the leaf extract of the plant.

During investigation, it has been found that aqueous and methanolic extracts of leaf and root of plants used in this study have shown higher zones of inhibition against *Staphylococcus aureus,* the opportunistic pathogen. This is in consonance with the findings of Becker *et al*. (2005). Observations in similar lines were found by Neelam and Bohra (2006) who reported that aqueous and alcoholic leaf extracts of *Delphinium ajacis* exhibited good inhibition against *Staphylococcus aureus*, this may due to the fact that plant contains a number of alkaloids.

Both aqueous and methanolic leaf and root extracts of *Abutilon indicum*, *Datura metal, Solanum nigrum* and *Trigonella foenum-graecum* have shown better inhibition against *Enterococcus* sp. Similar report was given by Kiveak (2002), who reported that the extracts prepared from *Arbutus andrachne* (Ericaceae) showed significant antibacterial activity against *Enterococcus faecalis*.

Leaf and root extracts of the study plants showed zones of inhibition in some extent against *Bacillus cereus.* This result indicated that the plants have growth inhibiting effect against the bacterium. This is inconsonance with the findings of Dulger *et al.* (2005).

Conclusion:

It is concluded that methanolic extracts of the study plants are better than aqueous extracts for the treatment of bacterial infection and the constituents, which are responsible for the antibacterial activity may be dissolved out only by means of methanol.

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