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ANTIMICROBIAL POTENTIAL OF SOME MEDICINAL PLANTS AGAINST SELECTED HUMAN PATHOGENS

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Abstract
The present study aimed at evaluating the *Invitro* antimicrobial potential of methanolic extracts of some ethno-medicinal plants viz., *Boerhaavia diffusa, Eclipta alba, Achyranthes aspera, Lawsonia inermis, Andrographis paniculata, Abutilon indicum and Withania somnifera* against selected human bacterial pathogens such as *E. coli, Salmonella typhi, Staphylococcus aureus, Enterococcus sp., Bacillus subtilis* and *Helicobacter pylori.*
The maximum inhibitory activity against *B. subtilis* and *Enterococcus Sp.* was shown by *Boerhaavia diffusa* whereas, *Withania somnifera* showed maximum inhibitory activity against *E. coli* and *S. typhi. Lawsonia inermis* showed maximum inhibitory activity against *S. aureus*. The maximum inhibitory activity against *H. pylori* of 7 mm zone of inhibition was shown by *Achyranthes aspera.* The plants such as *Eclipta alba, Andrographis paniculata* and *Withania somnifera* did not show inhibitory potential against *H. pylori.*
Key words: Antimicrobial potential, medicinal plants, human pathogen

Introduction:

There are the vast majority of microbes responsible for causing severe problems and diseases in the human. Some of these microorganisms are as *E. coli, Salmonella typhi, Staphylococcus aureus, Enterococcus sp., Bacillus subtilis* and *Helicobacter pylori. E. coli* is a gram-negative, facultative anaerobic, rod-shaped, coliform bacterium commonly found in the lower intestine of warm blooded organisms including Human being (Singleton P., 1999). Most *E. coli* strains are harmless, but some serotypes can cause serious food poisoning in their hosts (Vogt RL, Dippold L., 2005). Although, *Bacillus subtilis* is considered to be non-pathogenic but occasionally cause fatal disease like septicemia (Rabon Cox, 1959). *Enterococci* are part of the normal intestinal flora of humans and animals. *Enterococcus* species are gram positive and facultative anaerobic organisms (de Perio MA. et.al. 2006). They have been long recognized as important pathogens and only a few cause clinical infections in humans. *Enterococcus faecalis* and *Enterococcus faecium* are the most prevalent species cultured from humans, accounting for more than 90% of clinical isolates (Courvalin P., 2006). *S. aureus* is a gram-positive, round-shaped bacterium frequently found in the nose, respiratory tract, and on the skin. It is positive for catalase and nitrate reduction and is a facultative anaerobe (Masalha M; et al. 2001). It is a common cause of skin infections such as a skin abscess, respiratory infections such as sinusitis, and food poisoning. Pathogenic strains often promote infections by producing virulence factors such as potent protein toxins, and the expression of cell-surface proteins that bind and inactivate antibodies. The emergence of antibiotic-resistant strains of *S. aureus* is a worldwide problem in clinical medicine and there is no approved vaccine for it. The bacterial strain, *Salmonella typhi*, is rod-shape, flagellated, aerobic and gram-negative bacterium responsible for causing typhoid disease in human (Murray PR. et.al. 2009). The bacterium *Helicobacter pylori* is a gram-negative, microaerophilic bacterium found usually in the stomach. It is associated with chronic gastritis and gastric ulcers. It is also linked to the development of duodenal ulcers and stomach cancer. However, over 80% of individuals infected with the bacterium are asymptomatic, and it may play an important role in the natural stomach ecology (Blaser MJ, 2006).

To cure the problems caused by infection of such microbes, the current therapy is based on use of synthetic drugs and antibiotics. Although the synthetic drugs have been used in emergency, they possess many side effects. Therefore, it is necessary to introduce an alternative remedial regimen.

In the traditional system of India, various indigenous plants are used in the diagnosis, prevention and cure of physical and mental problems of the people (Manjunath 1990). The drugs of herbal origin are used as a medicine in Unani and Ayurveda since ancient times. Medicinal plants are the source of important therapeutic aid for alleviating human and animal ailments. The whole plants or its parts like leaves, stem, bark, root, flower, fruits and seed are used as a source of medicine by the folk healers and local community. Large quantity of this raw drug traded in the market as a raw material for herbal drugs industries. Now a day, again the people have started using of plants and plant based drugs in order to

avoid the toxicity and health hazards associated with indiscriminate use of synthetic drugs and antibiotics. Although, several of plant species have been tested for their antimicrobial properties but the vast majority of plants have not been adequately evaluated.

The present study was carried out to evaluate the antimicrobial potential of some selected plants as *Boerhaavia diffusa, Eclipta alba, Achyranthes aspera, Lawsonia inermis, Andrographis paniculata, Abutilon indicum and Withania somnifera.*

Material and Methods:

Collection of Plant Material: Fresh leaves, stem and roots of seven different plants viz., *Boerhaavia diffusa, Eclipta alba, Achyranthes aspera, Lawsonia inermis, Andrographis paniculata, Abutilon indicum* and *Withania somnifera* were collected from different localities given in **Table1**. The different plant parts were washed thoroughly 2-3 times with running water and finally by sterilized water. The parts were then air dried under shade.

Solvent Extraction: The dried plant material then powdered with the help of blender. 25 g of shade-dried powder of each plant material was filled in the thimble and extracted successively with methanol in Soxhlet extractor. The solvent extracts were concentrated under reduced pressure and preserved at 5°C in airtight bottle until further use.

Growth and Maintenance of Test Microorganisms:

Bacterial cultures of *Escherichia coli, Salmonella typhi, Staphylococcus aureus, Enterococcus Sp., Bacillus subtilis* and *Helicobacter pylori* were collected and maintained on nutrient broth (NB) at 37°C and were used as test organisms for antimicrobial study of selected plant material.

Anti microbial activity: The test microbes were pre-cultured in nutrient broth overnight in a rotary shaker at 37°C. The extract powder of *Boerhaavia diffusa, Eclipta alba, Achyranthes aspera, Lawsonia inermis, Andrographis paniculata, Abutilon indicum* and *Withania somnifera* was tested by disc diffusion method (Anonymous, 1996). The test microorganisms 10 µl were seeded into respective medium by spread plate method. After solidification the filter paper discs (5 mm in diameter) impregnated with the extracts were placed on test organism-seeded plates. The assay plates were incubated at 37°C for 24h. The diameters of the inhibition zones were measured in mm.

Results:

Results obtained in the present study relieved that, the tested seven medicinal plants extracts such as *Boerhaavia diffusa, Eclipta alba, Achyranthes aspera, Lawsonia inermis, Andrographis paniculata, Abutilon indicum* and *Withania somnifera* possess potential antibacterial activity against *Escherichia coli, Salmonella typhi, Staphylococcus aureus, Enterococcus Sp., Bacillus subtilis* and *Helicobacter pylori*. The maximum inhibitory activity against *B. subtilis* and *Enterococcus Sp.* was shown by *Boerhaavia diffusa* (14.5 mm and 11.0 mm zone of inhibition respectively) whereas, *Withania somnifera* showed maximum inhibitory activity against *E. coli* (15.1 mm zone of inhibition) and *S. typhi* (12.1 mm zone of inhibition) . *Lawsonia inermis* showed maximum inhibitory activity against *S. aureus* (10 mm zone of inhibition). The maximum inhibitory activity against H. pylori of 7 mm zone of inhibition was shown by *Achyranthes aspera.* The plants such as *Eclipta alba, Andrographis paniculata* and *Withania somnifera* did not show inhibitory potential against *H. pylori.*

Table: 1. Characteristics of plants used in the study

Scientific name	Family	Collection site	Part used
Boerhaavia diffusa	Nyctaginaceae	Field (Akot)	Leaves
Eclipta alba	Asteraceae	Popatkhed	Leaves
Achyranthes aspera	Amaranthaceae	Narnala Sanctuary	Leaves
Lawsonia inermis	Lythraceae	Popatkhed	Leaves
Andrographis paniculata	Acanthaceae	Narnala Sanctuary	Leaves and Stem
Abutilon indicum	Malvaceae	Popatkhed	Stem
Withania somnifera	Solanaceae	Narnala Sanctuary	Roots and Leaves

Table 2: Antibacterial activity of medicinal plant extracts (100 µg /ml) against bacterial species tested by disc diffusion assay in the form of zone of inhibition in mm.

Scientific name	*E. coli*	*S. typhi*	*S. aureus*	*Entero coccus sp.*	*B. subtilis*	*H. pylori*
Boerhaavia diffusa	4.5	10.0	9.2	11.0	14.5	4.0
Eclipta alba	6.2	5.8	7.3	10.0	9.1	-
Achyranthes aspera	5.1	9.1	6.0	8.0	7.5	7.0
Lawsonia inermis	7.5	7.0	10.0	4.3	8.1	4.3
Andrographis Paniculata	9.1	8.1	7.0	6.8	7.3	-
Abutilon indicum	2.0	11.0	6.0	4.3	10.5	3.0
Withania somnifera	15.1	12.1	5.3	3.0	14.3	-

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