Evaluation of antibacterial activity of various Indian plants

Ankur Gupta[1], Surabhi Mahajan[1] and B.M. Agarawal[2]

[1]Department of Microbiology, School of Life Sciences, Dr. B.R.Ambedkar University, Agra-282002 U.P., India,

[2] Rted. Professor of microbiology, S.N.Medical College, Agra-282002 U.P., India,

Introduction

Medicinal plants of India have been found of immense global importance in treatments because of adverse effect of synthetic drug had created varied types of complicated diseases, besides causing resistance to synthetic drug. The bacterial organisms over a period of time change their antibiotic sensitivity patterns and develop resistance against commonly used therapeutic gents. Hence there is need to develop a novel herbal antibacterial formulation to get rid off resistance. Govindarajan et al. (2005), Meenakshi et al. (2006), Sudhakar et al. (2006) and Parasnath et al. (2006) had valuated screening of antibacteiral activity against Indian medicinal plants while, Pal et al. (2004), Sarin and Khandelwal (2005) and Rastogi et al. (2006) performed phytochemical investigation of various Indian plants for various functions. Present study is designed to find out antibacterial activity of some Indian plants along with phytochemical analysis.

Materials and Methods

Sixteen medicinal plants *Curcuma longa* rhizome (Haldi), *Syzygium cumini* bark (Jamun), *Gardenia umifera* leave (Gandharaj), *Eucalyptus hybrida* leaves (Safeda), *Holarrhena antidysentrica* bark (Khurchi), *Emblica officinalis* fruit (Amla), *Glorlosa superba* leaves (Kaliharl), *Aegle marmelos* fruit (Bel), *Cordia myxa* leaves (Lasoda), *Ficus glomerata* leaves (Gular), *Dalbergia sissoo* bark (Shishum), *Cassia tora* leaves (Chakunda), *Bambusa arundinacea* leaves (Bans), *Calotropis procera* leaves (Madar), *Lantana camara* leaves (Ghaneri) and *Hibiscus rosa sinensis* leaves (Gudhal) were selected and collected horn local region Agra district (U.P.) in suitable season. The collected plants materials were shade dried and grind to coarse powder. The coarse powder (100 gm) of different plants was exhaustively extracted using methanol in Soxhlet extractor for a period of 22 hours, as per standard methods. Prepared liquid extracts were concentrated by vacuum rotatory evaporator (Heidolph, Germany), in which the temperature of water bath and Rota cool was kept at 35°C and 4°C respectively with 147 bar vacuum pressure. Qualitative analysis of active constituents was done by standard methods (Chatterjee et al., 1984) to find out the constituents like protein (Biuret method), carbohydrates (Fehling method), fats (Spot method), saponins (Froth test), glycosides (Legal rest), flavinods (Shinoda test and alkaloids (Mayer test), etc.

Plant extracts were tested with different concentrations (500 mg/ml, 250 mg/ml, 125 mg/ml and 62.5mg/ml) by agar well diffusion method (Mukherjee et al., 1995) against isolated 032, 026 and 02 strains of *E. coli* (ETEC).

The nature, colour, consistency and odour noted for each extract, which was characteristics of each particular extract, which help in preliminary identification of particular plant extracts, Solubility of extracts were checked in commonly used solvent like distilled water, ethanol, methanol, petroleum ether, acetone and chloroform for testing. All sixteen plants extracts were soluble in methanol. Out of sixteen plants, nine plants soluble in ethanol and only one plant extract soluble in distilled water and petroleum ether. Plants extracts were also tested for chemical constituents such as alkaloids, saponins, flavinoids, protein, carbohydrates, triterpenoids, tannin arid glycosides. Out of sixteen plants six were positive for alkaloids, six for glycosides, five for carbohydrates, two for protein, eleven for tannins, eight for flavinoids, for for triterpenoids and 6 for saponins.

Prepared sixteen plants extracts were tested for antibacterial activity by agar well diffusion method against pathogenic isolated plants. *E. coli*. Out of sixteen plants 4 plants *Curcuma longa rhizome* (haldi), *Syzygium cumini bark* (Jamun), *Eucalyptus hybrida* leaves (Safeda) and *Halarrhena antidysentrica* bark (Khurchi) showed maximum zone of inhibition 20 mm, 12 mm, 10 mm, 14 mm respectively at 12.5 mg/well concentration, 18 mm, 8 mm, 8 mm, 9 mm respectively at 6.25 mg/well concentration, while 14 mm, 6 mm, 6 mm, 7 mm respectively at 3.12 mg/well concentration. Maximum zone of inhibition in these plants is due to the presence of active constituents like flavinoid or triterpenoids. On other hand twelve plants did not show zone of inhibition hence considered inert plants.

Table 1 : Phytochemical and antibacterial potential of plant extracts

Crude extract	Alkaloids	Glycoside	Carbohydrate	Protein	Tannins	Flavonoids	Triperpenoids	Saponins	Antibacterial susceptibility	
									Cons./well	Zone of inhibition
Curcuma longa (rhizome)	+	+	+	-	+	+	-	-	12.50 6.25 3.12 1.56	20 mm 18 mm 14 mm 12 mm
Syzygium cumini (bark)	-	-	-	-	+	-	+	+	12.50 6.25 3.12 1.56	12 mm 8 mm 6 mm nil
Gardenia gummifera (leaves)	+	+	-	-	-	-	-	+	12.50 6.25 3.12 1.56	10 mm 8 mm 6 mm 6 mm
Eucalyptus hybrida (leaves)	+	-	-	-	+	+	+	+	12.50 6.25 3.12 1.56	14 mm 9 mm 7 mm 6 mm
Holarrhena antidysenterica (Bark)	-	-	-	-	+	+	+	+	-	*
Emblica officinalis (fruit)	-	+	+	+	+	+	-	-	-	*
Gloriosa superva (leaves)	+	-	-	-	-	-	-	-	-	*
Aegle marmelos (fruit)	-	-	+	+	+	-	-	-	-	*
Cordia myxa (leaves)	-	-	-	+	+	+	-	-	-	*
Ficus glomerata (leaves)	+	+	+	-	+	+	-	-	-	*
Dalbergia sissoo (bark)	-	-	-	-	+	+	-	-	-	*
Cassia tora (flower)	+	-	+	-	-	-	-	+	-	*
Bambusa arundinacea (leaves)	-	-	-	-	+	-	+	-	-	*
Calotroips procera (leaves)	-	+	-	-	-	-	-	-	-	*
Lantana camara (leaves)	-	+	-	-	+	+	+	+	-	*
Hibiscus rosa sinensis (leaves)	-	-	-	-	-	-	-	-	-	*

* Not show zone of inhibition hence considered inert plants

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