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Screening of Antibacterial Activity of Some Indian Plants with their Phytochemical Analysis

Manish Dubey, Ashok Kumar, K. Mahour*, D. Dwivedi and V.S. Vihan

Division of Animal Health, Central Institute for Research on Goats, Makhdoom, Farah Mathura - 281 122, India.

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Antimicrobial activities of 16 plant extracts were assessed by well diffusion method against pathogenic *E.coli* along with phytochemcial investigation. The collected and prepared methanolic plant extracts were tested for chemical constituents such as alkaloids, saponins, flavinoids, protein, carbohydrates, triterpenoids, tannin and glycosides and tested against *E.coli* at 12.5, 6.25, 3.12, 1.56 and 0.39 mg/disc concentrations, which revealed 4 plants viz. *Terminalia catappa* leaves (Badam), *Syzygium cumini* bark (Jamun), *Eucalyptus hybrida* leaves (Safeda) and *Holarrhena antidysentrica* bark (Khurchi) showed maximum zone of inhibition 20 mm, 12 mm, 10 mm, 14 mm respectively at 12.5 mg/disc concentration, 18 mm, 8 mm, 8 mm 9 mm respectively at 6.25 mg/disc concentration, while 14 mm, 6 mm, 6 mm, 7 mm respectively at 3.12 mg/disc concentration. Maximum zone of inhibition in these plants is due to the presence of active constituents like flavinoid or triterpenoids. On other hand 12 plants did not show zone of inhibition hence considered inert plants.

Key words: *E.coli*, Well diffusion, Active constituents, Zone of inhibition.

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 agents. Hence there is need to developed a novel herbal antibacterial formulation to get rid off resistance. Various workers have been evaluated screening of antibacterial activity against Indian medicinal plants (Govindarajan *et al*. 2005, Meenakshi *et al*., 2006, Sudhakar *et al*., 2006 and Prasanth *et al*., 2006)[1-4] while some performed phytochemical investigation for various functions (Pal *et al*., 2004, Sarin and Khandelwal, 2005 and Rastogi *et al*., 2006)[5-7]. However, a lot of work is still left. Considering this fact present study is designed to find out antibacterial activity of some Indian plants along with phytochemical analysis against *E. coli*.

MATERIAL AND METHODS

Collection of plants material

16 medicinal plants (*Terminalia catappa* leaves (Badam), *Syzygium cumini* bark (Jamun), *Gardenia gumifera* leaves (Gandharaj), *Eucalyptus hybrida* leaves (Safeda), *Holarrhena antidysentrica*

* To whom all correspondence should be addressed.
Tel.: +91-9412404655;
E-mail: kris_mathura@yahoo.com, dubeymanish22@rediffmail.com

bark (Khurchi), *Emblica officinalis* fruit (Amla), *Gloriosa superba* leaves (Kalihari) , *Aegle marmelos* fruit (Bel), *Cordia myxa* leaves (Lasoda), *Ficus glomerata* leaves (Gular), *Dalbergia sissoo* bark (Shisum), *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 from local region Mathura district (U.P.) in suitable season.

Preparation of plant extract

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 35ºC and 4ºC respectively with 147 bar vaccum pressure.

Qualitative analysis

Qualitative analysis of active constituents was done by standard methods (Kokarte *et al*., 2005)[8] to find out the constituents like protein (Biuret method), carbohydrates (Fehling method), fats (Spot method), saponins (Froth test), glycosides (Legal rest), flavinoids (Shinoda test) and alkaloids (Mayer test) etc.

Antibacterial activity

Plant extracts were tested with different concentrations (500 mg/ml, 250 mg/ml, 125mg/ml, 62.5 mg/ml and 32.5 mg/ml) by agar well diffusion method (Mukherjee et al., 1995)[9] against isolated *E.coli*.

RESULTS AND DISCUSSION

The nature, colour, consistency and odour noted for each extract, which was characteristics to 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 16 plants extracts were

Table 1. Antibiogram of potential plant extracts (Well diffusion method)

S. No.	Plants extract	Common name	Cons./disc	Growth Inhibition zone (mm)
1	*Terminalia catappa* (Leaves)	Jungli badam	12.5 mg	20 mm
			6.25 mg	18 mm
			3.12 mg	14 mm
			1.56 mg	12 mm
			0.78 mg	10 mm
			0.39 mg	Nil
2	*Syzygium cumini* (Bark)	Jamun	12.5 mg	12 mm
			6.25 mg	8 mm
			3.12 mg	6 mm
			1.56 mg	Nil
			0.78 mg	Nil
			0.39 mg	Nil
3	*Eucalyptus hybrida* (Leaves)	Safeda	12.5 mg	10 mm
			6.25 mg	8 mm
			3.12 mg	6 mm
			1.56 mg	6 mm
			0.78 mg	6 mm
			0.39 mg	Nil
4	*Holarrhena antidysenterica* (Bark)	Utpala	12.5 mg	14 mm
			6.25 mg	9 mm
			3.12 mg	7 mm
			1.56 mg	6 mm
			0.78 mg	6 mm
			0.39 mg	Nil

Table 2. Phytochemical constituents of selected plants

S.No	Crude extract	Alkaloids	Glyco-side	Carbohydrate	Prot-ein	Tannins	Flavonoid	Triterpenoids	Saponins
1	*Terminalia Catappa*(Leaves)	+	+	+	-	+	+	-	-
2	*Syzygium cumini* (Bark)	-	-	-	-	+	-	+	+
3	*Gardenia gummifera*(Leaves)	+	+	-	-	-	-	-	+
4	*Eucalyptus hybrida* (Leaves)	+	-	-	-	+	+	+	+
5	*Holarrhena antidysenterica*(Bark)	-	-	-	-	+	+	+	+
6	*Emblica officinalis*(Fruit)	-	+	+	+	+	+	-	-
7	*Gloriosa superba*(Leaves)	+	-	-	-	-	-	-	-
8	*Aegle marmelos*(Fruit)	-	-	+	+	+	-	-	-
9	*Cordia myxa*(Leaves)	-	-	-	+	+	+	-	-
10	*Ficus glomerata*(Leaves)	+	+	+	-	+	+	-	-
11	*Dalbergia sissoo*(Bark)	-	-	-	-	+	+	-	-
12	*Cassia tora*(Flower)	+	-	+	-	-	-	-	+
13	*BambusaArundinacea*(Leaves)	-	-	-	-	+	-	+	-
14	*Calotropis procera*(Leaves)	-	+	-	-	-	-	-	-
15	*Lantana camara*(Leaves)	-	+	-	-	+	+	+	+
16	*Hibiscus rosa sinensis*(Leaves)	-	-	-	-	-	-	-	-

soluble in methanol. Out of 16 plants, 9 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 and glycosides. Out of 16 plants 6 were positive for alkaloids, 6 for glycosides, 5 for carbohydrates, 2 for protein, 11 for tannins, 8 for flavinoids, 5 for triterpenoids and 6 for saponins (Sobhi *et al*, 1985)[10] (Table 2).

Prepared 16 plants extracts were tested for antibacterial activity by agar well diffusion method against pathogenic isolates *E. coli*. Out of 16 plants 4 plants *Terminalia catappa* leaves (Badam), *Syzygium cumini* bark (Jamun), *Eucalyptus hybrida* leaves (Safeda) and *Holarrhena antidysentrica* bark (Khurchi) showed maximum zone of inhibition 20 mm, 12 mm, 10 mm, 14 mm respectively at 12.5 mg/disc concentration, 18 mm, 8 mm, 8 mm 9 mm respectively at 6.25 mg/disc concentration, while 14 mm, 6 mm, 6 mm, 7 mm respectively at 3.12 mg/disc concentration (Table 1). Maximum zone of inhibition in these plants is due to the presence of active constituents like flavinoid or triterpenoids (Dixit *et al*., 2007 and Chopade *et al*., 2008)[11-12]. On other hand 12 plants did not show zone of inhibition hence considered inert plants.

CONCLUSION

16 plants extracts were screen out by well diffusion method against pathogenic *E. coli* along with phytochemical investigation. Out of 16 plants 8 were positive for flavinoids and 5 for triterpenoids active constituents. Maximum zone of inhibition has been found in plants extract which are positive for flavinoids and triterpenoids. Hence present study concluded that in herbal drug development (antimicrobial) only those plants should be used which is having flavinoids and triterpenoids active constituents.

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