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IN VITRO ANTIMICROBIAL ACTIVITY AND PHYTOCHEMICAL ANALYSIS OF SOME INDIAN MEDICINAL PLANTS

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ABSTRACT

On pathogenic strains such as B cerus (ATCC11778), S aureus (ATCC25923). E aerogenes (ATCC13048), E coli (ATCC25922) & K pneumoniae (NCIM2719) the antibacterial effects of few selected Indian medicinal plants were evaluated. Water and methanol were the solvents used for extracting the extracts. The invitro antibacterial assessment was carried out using the procedure of agar well diffusion method. The most susceptible Gram-positive bacteria was B. cerus and Gram-negative was K. pneumoniae. None of the bacterial strains studied could be inhibited by the extracts of Abrus precatourius, Cardiospermum halicacabum and Gmelina asiatica.

Key words: Abrus precatourius, Cardiospermum halicacabum, Gmelina asiatica, In vitro, Antibacterial

INTRODUCTION

The leading cause of death world-wide is infectious diseases. Resistance to antibiotics has been a worldwide problem **[1,3].** The advent of multidrug-resistant infections is threatening the therapeutic effectiveness of several current antibiotics **[2].** Many infectious diseases in mankind's history have been known to be treated with herbal remedies. Due to the unparalleled abundance of chemical variety, natural products, wither as pure chemicals or as generic plant extracts, offer limitless possibilities for the fresh drug leads. The discovery of new antimicrobial compounds with complex chemical structures and novel mechanisms of action for new and re-emerging infectious diseases is a persistent and urgent need **[3].**

Researchers are also gradually concentrating their efforts on folk medicine, finding new opportunities to produce improved medicines for microbial infections **[4,7,8].** Screening of many medicinal plants for their possible antimicrobial activity has resulted from the growing failure of chemotherapy and antibiotic reisitance demonstrated by pathogenic microbial infectious agents **[5, 6].**

METHODOLOGY

Sample collection:

Samples *Abrus precatourius, Cardiospermum halicacabum* and *Gmelina asiatica* were collected from the local nursery of Varanasi.

Preparation of plant extracts:

The leaves were removed from *Abrus precatourius, Cardiospermum halicacabum* and *Gmelina asiatica* and then washed with distilled water. Further the leaves were sundried and grinded to powder. The samples (leaves powder) were dissolved in polar and nonpolar solvents ad incubated at room temperature for 48 hours. The samples were filtered and collected in the weighed bowl and then allowed for the evaporation of solvents. After evaporation the remaining residues were dissolved in dimethyl sulphoxide and preserved at -20°C.

Reviving of pathogens:

Bacterial pathogens *B cerus* (ATCC11778), *S aureus* (ATCC25923). *E aerogenes* (ATCC13048), *E coli* (ATCC25922) & *K pneumoniae* (NCIM2719) were inoculated in sterilized nutrient broth media and then incubated at 37°C for 24 hours and then used for the analysis of the extracts.

Screening for antibacterial properties:

The screenings of the extracts were carried out by performing the antibacterial susceptibility test by using agar well diffusion method. The 50 µl plant extracts were loaded on the well and then zone of inhibition was calculated after 24 hours of incubation at 37°C.

Phytochemical screening:

The plant extracts were qualitatively analyzed for the presence & absence of secondary metabolites, such as alkaloids, flavonoids, terpenoids, steroids, saponins.

Results & Discussions

Sample collections and extract preparations:

The samples were collected from local area of Varanasi as shown in table 1. After the collection of leaves samples, the dirt was removed after washing with distilled water and then allowed to dry. The dry powders were dipped in polar and polar solvents. After the completion of incubation the samples were filtered and then allowed for the evaporation of solvents as mentioned in figure 1.

Tabl1 1: The collected leaves samples

S no.	Plant name	Location
1.	 *Abrus precatourius*	Mandaudih
2.	 *Cardiospermum halicacabum*	Mandaudih
3.	 *Gmelina asiatica*	Mandaudih

Figure 1: The collected plant extracts in a bowl.

Antibacterial screening

The extracts were screened for the antibacterial property and compare with the tetracycline and found that Cardiospermum halicacabum shows maximum zone of inhibition by inhibiting the growth of bacterial pathogens as shown in figure 2 and table 2.

Table 2: Antibacterial screening of extracts.

Pathogens	Zone of Inhibition (mm)			
	Acetone	Chloroform	Petroleum ether	Tetracycline
Abrus precatourius				
B cerus	11	0	9.9	20.1
S aureus	12	0	10.2	21.3
E aerogenes	0	0	11.2	20
E coli	0	10	0	25.2
K pneumoniae	0	11.2	0	21.3
Cardiospermum halicacabum				
B cerus	11	12.5	19.9	20.1
S aureus	12	8.9	20.2	21.3
E aerogenes	14	20.1	21.2	20
E coli	12.6	10	21.1	25.2
K pneumoniae	14.8	11.2	19.8	21.3
Gmelina asiatica				
B cerus	11.9	10.5	10.9	20.1
S aureus	12.2	11.9	11.2	21.3
E aerogenes	14.8	9.9	0	20
E coli	12	10.2	0	25.2
K pneumoniae	10	11	0	21.3

Phytochemical screening

Table 3: Phytochemical tests of extracts

S no.	Tests	Acetone	Chloroform	Petroleum ether
1	Tanin	+	_	-
2	Saponin	+	+	+
3	Alkaloid	+	+	+
4	Flavonoid	+	-	+
5	Terpernoid	+	+	-
6	Protein	+	+	-
7	Carbohydrate	+	+	+

Preliminary phytochemical analysis revealed the presence of alkaloids (+ve test for Wagner's - Table 3) and saponins. The other secondary metabolites like tannins, flavonoids, steroids, cardiac glycosides, etc. were present in trace amounts in some of the plants (Table 3).

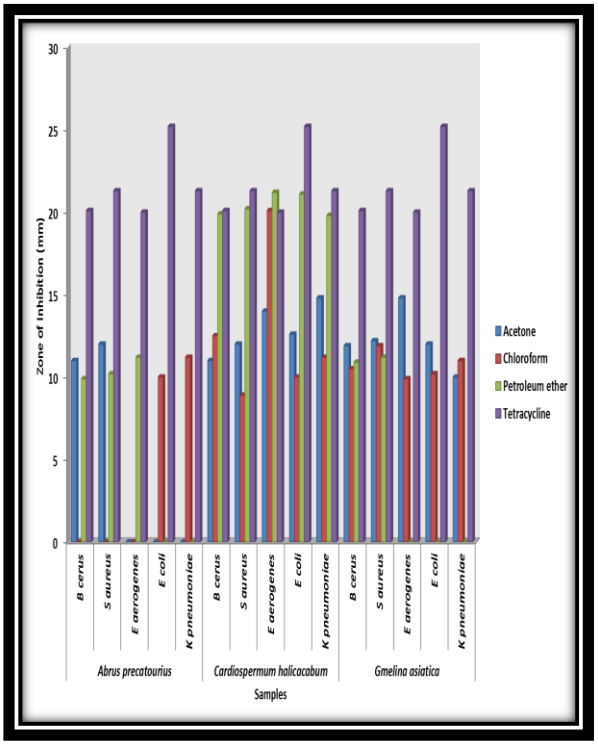

Figure 2: the graphical representation of antibacterial testing.

It is not surprising that there are differences in the antimicrobial effects of plant species, due to the phytochemical properties and differences among species. It is quite possible that some of the plants that were ineffective in this study do not possess antibiotic properties, or the plant extracts may have contained antibacterial constituents, just not in sufficient concentrations so as to be effective. It is also possible that the active chemical constituents were not soluble in methanol or water (18). The drying process may have caused conformational changes to occur in some of the chemical constituents found in these plants.

The potential for developing antimicrobials from higher plants appears rewarding as it will lead to the development of a phytomedicine to act against microbes. Plant-based antimicrobials have enormous therapeutic potential as they can serve the purpose with lesser side effects that are often associated with synthetic antimicrobials (Iwu et al., 1999). Continued further exploration of plant- derived antimicrobials is needed today. Further research is necessary to determine the identity of the antibacterial compounds from within these plants and also to determine their full spectrum of efficacy. However, the present study of in vitro antimicrobial evaluation of some plants forms a primary platform for further phytochemical and pharmacological studies.

CONCLUSION

In conclusion, *Caesalpinia pulcherrima* extracts possess a broad spectrum of activity against a panel of bacteria responsible for the most common bacterial diseases. These promissory extracts open the possibility of finding new clinically effective antibacterial compounds

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