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Studies on antibacterial activity of some medicinal plant against Human pathogenic Micro Organism

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ABSTRACT

The bacteria organisms were isolated from drinking water (Bacillus, Borchothrix, Clavibacter sp, Anguslobacter sp, and Brevi bacterium). Selected Indian medicinal plants Strychnos nuxvomica and cassia angustifolia were selected for antibacterial studies . The solvents used for the extraction of plant roots were n- butanol, ethyl acetate and distilled water. The invitro antibacterial activity was performed by agar well diffusion method. The most susceptible Gram-Postive bacteria was Bacillus sp, Brevibacterium sp, and the most susceptible Gram-negative bacteria was Borchothrix sp, Clavibacter sp, and Ancylobacter sp. The extracts of plant Strychnos nuxvomica and cassia angustifolia inhibited the growth of the bacterial strains investigated. The most active extracts was compared with the standard antibiotics, pencillin, Streptomycin and Ampicillin 100mg/disc). The results obtained in the present study suggest that Strychnos nuxvomica and cassia angustifolia could be used in treating diseases caused by the test organisms. The results are discussed in detail.

Key Words: Medicinal Plants, antibacterial activity, aqueous extract, n-butanol excretory ethyalcetate extract.

INTRODUCTION

Medicinal plants are a source of great economic value in the Indian subcontinent. Nature has bestowed on us a very rich botanical wealth and a large number of diverse types of plants grow in different parts of the country. India is rich in all the three levels of biodiversity, namely species diversity, genetic diversity and habitat diversity. In India thousands of species are known to have medicinal value and the use of different parts of several medicinal plants to cure specific aliments has been in vogue since ancient times. Herbal medicine is still the mainstay of about 75-80% of the whole population, mainly in developing countries. For primary health care because of

better cultural acceptability better compatibility with the human body and fewer side effects. However, the last few years have seen a major increase in their use in the developed world (1).

Infectious diseases are the leading cause of death world –wide. Antibiotic resistance has become a global concern (2). The Clinical efficacy of many existing antibiotics is being threatened by the emergence of multidrug – resistant pathogens (3). Many infection diseases have been known to be treated with herbal remedies throughout the history of mankind. Natural products, either as pure compounds or as standardized plant extract, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action for new and re – emerging infectious diseases (4) There fore researchers are increasingly turning their attention to folk medicine, looking for new leads to develop better drugs against microbial infection (5). The increasing failure of chemotherapeutics and antibiotic resistance exhibited by pathogenic microbial infectious agents has led to the screening of several medicinal plants for their potential antimicrobial activity (6,7) India is a varietal emporium of medicinal plants and is one of the richest countries in the world with regard to genetic resources of medicinal plants. It exhibits a wide range in topography and climate, which has a bearing on its vegetation and floristic composition more over, the agro-climatic conditions are conducive for introducing and domesticating new exotic plant varieties (8)

MATERIALS AND METHODS

Plant Collection

The plant species namely *Strychnos nuxvomica* and *cassia angustifolia* were collected in Thanjavur –karupamudaliyar kottai. The collected samples were carefully stored in sterile polythene bags and used for the present study.

Sterilization of plant materials :

About 1gram of fresh and healthy roots were taken for each solvent including aqueous. The roots of both plants (*Strychnos nuxvomica* and *cassia angustifolia*) were sterilized with running tap water and soaked in 0.1% mercuri chloride Finally, the roots were washed with distilled water (three times) and shade dried.

Composition of nutrient Agar medium:

Chemicals		Composition
Beef extract	-	3g
Peptone	-	5g
Sodium chloride	-	5g
Agar	-	20g
Distilled water	-	1000ml
pH	-	7.0

Preparation of plant root extract:

About one gram of sterilized roots were ground in mortar and pestle with 10ml of aqueous and organic solvents (ethyl acetate, and n-butanol it was filtered through what mann No1 filter paper, the supernatant was collected and stored for antibacterial screening

Antibacterial activity (Agar –well diffusion method)

The antibacterial activities of the roots were tested against the selected bacterial strains. The 20ml of sterilized agar medium was poured into each sterile petriplates and., allowed to solidify. The test bacterial cultures were evenly spread over the appropriate media by using a sterile cotton, Swab. Then a well of 0.5 cm was made in the medium by using a sterile cork borer, 150 µl of each ethylacetate, n-butanal and aqueous plant extracts were transferred into separated wells. After these plates was incubated at 37^{o}C for 24-48 hours. After incubation period, the results were observed and measured the diameter of inhibition zone around the each well.

RESULTS AND DISCUSSION

In the present investigation, the anti bacterial properties of ethyl acetate, n – butanol and aqueous extracts of two medicinal plants *Strychnos nuxvomica* and *cassia angustifolia* viz.., were tested against five human pathogenic bacteria. The antibacterial properties of the two extracts of *Strychnos nuxvomica* were also comparatively analysed sensitivity test.

Antibacterial activity of *Strychnos nuxvomica*

The ethylacetate extract of *Strychnos nuxvomica*, exhibited maximum zone of inhibition against *Bacillus* (17mm), Brochothrix (18mm), Clavibacter (16mm), Ancylobacter (20mm) and Brevibacterium (20mm) were observed.

The n- butanol extract of *Strychnos nuxvomica*, showed maximum zone of inhibition against *Bacillus*(25mm), *Borchothrix*(30mm), *Clavibacter*(30mm), *Ancylobacter*(25mm) and Brevibacterium(30mm).

The aqueous extract of root showed the inhibition zone diameter ranging from 13-16mm against tested bacterial pathogens (Table-2).

Antibacterial activity of *cassia angustifolia*

The ethylacetate extract of *cassia angustifolia* exhibited maximum zone of inibition against *Bacillus*(12mm), *Ancylobacter*(10mm) was observed.

The n-butanol extract of *cassia angustifolia* showed maximum zone of inhibition against Bacillus(18mm), Borchothrix(25mm), Clavibacter(25mm), Anchylobacter(30mm) and Brevibacterium(30mm).

The aqueous extract of root showed no zone inhibition against tested bacterial pathogens (Table-2).

Antibiotic sensitivity test (positive control)

The antibiotic sensitivity test using standard antibiotics, viz.., streptomycin, ampicillin and pencillin were tested against both bacteria studied. The results of antibiotic sensitivity represented (Table-3).

All the antibiotics used were exihibited higher antibacterial activity. The results confirmed that both the solvent extract of *Strychnos nuxvomica* and *cassia angustifolia* exihibited a higher

antibacterial activity against *Bacillus,Borchothrix, Clavibacter, Ancylobacter* and *Brevibacterium.*

Similarly. when compared to the standard antibiotics. the solvent extract of *Strychnos nuxvomica* and *cassia angustifolia* showed higher antibacterial activity against the bacteria (Table-3).

Antibacterial effect of solvents (negative control)

The antibacterial effect of ethyl acetate, n-butanol, and water solvents revealed no activity against bacteria studied.

Table-1Antibacterial activity of *Strychnos nuxvomica* plant extract

S. No	Name of the organisms	Organic Solevents		
		Ethyl acetate	n-butanol	Distilled water
		Zone of inhibition (mm)		
1	*Bacillus subtilis*	17mm	25mm	13mm
2	*Borchothrix campestris*	18mm	30mm	15mm
3	*Clavibacter iranicus*	16mm	30mm	12mm
4	*Ancylobacter aquaticus*	20mm	25mm	17mm
5	*Brevibacterium linens*	20mm	30mm	16mm

Table- 2 Antibacterial activity of *cassia angustifolia*,plants extract

S. No	Name of the organisms	Organic Solevents		
		Ethyl acetate	n-butanol	Distilled water
		Zone of inhibition (mm)		
1	*Bacillus subtilis*	12mm	18mm	-
2	*Borchothrix campestris*	-	25mm	-
3	*Clavibacter iranicus*	-	25mm	-
4	*Ancylobacter aquaticus*	10mm	30mm	-
5	*Brevibacterium linens*	-	30mm	-

Table- 3 Antibiotic sensitivity test on bacteria (positive control)

S.No	Name of the organisms	Streptomycin	Ampicillin	Pencillin
		Zone of inhibition (mm)		
1.	*Bacillus subtilis*	13	10	10
2.	*Borchothrix campestris*	11	10	10
3	*Clavibacter iranicus*	12	-	-
4	*Ancylobacter aquaticus*	10	8	12
5	*Brevibacterium linens*	-	-	-

The maximum antibacterial activity was shown by *Strychnos nuxvomica* and *cassia angustifolia*, reapectively. The methanol extracts of the investigated plants showed maximum antibacterial activity against gram-negative *Ancylobacter*, similar results were also reported by venkatesan *et al* 2006. In the present study *Strychnos nuxvomica* plants showed maximum inhibition of 30mm and minimum of 16mm.

The potential for developing antibacterials from higher plants appears rewarding as it will lead to the development of phylomedicine to act against microbes. Plant-based antibacterial have

enormous therapeutic potential as they can serve the purpose with lesser side effects that are often associated with synthetic antibacterials (Lwu *et al* 1999).

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