Research Article

Screening of Preliminary Phytochemical Analysis and Antibacterial Activity of (*Calotropis gigantea* L. And *Datura metel* L.) Against Selected Pathogenic Microorganisms

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ABSTRACT

Several hundreds of plant genera are used medicinally and plants are vital sources for potent and powerful drugs. Plants are exploited as medicinal source since ancient age. The traditional and folk medicinal system uses the plant products for the treatment of various infectious disease. About 75%of the Indian population relies heavily on the use of herbal drugs for the treatment of diseases. Medicinal herbs have a long history in improving human health and curing various diseases. A wide interest has been made for researchers using herbal material in identification of the active components and verification of their efficiency. Many researches are working seriously to find out substitutes for antibiotics as they cause side effects on the functioning of different parts of the body, organs and systems over the last twenty years. Ethno botanical and ubiquitous plants provide a rich resource for natural drug research and development. In the present investigation, the phytochemical and antibacterial activity of *Calotropis gigantea* and *Datura metel*. Solvent used Chloroform, Acetone and Ethanol antibacterial activity maximum in *Calotropis gigantea* against *Staphylococcus aureus Escherichia coli, Salmonella spp, Klebsiella spp,* compared to *Datura metel*. Synergism between plant extract and synthetic antibiotics can develop standardization of herbal medicine for treatment and prevention of infectious diseases.

Keywords: Antibacterial, disc diffusion, medicinal plant, phytochemical

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INTRODUCTION

Plant research has increased all over the world and a large body of evidence has collected to show immense potential of medicinal plants used in various traditional systems (Ayurveda, Siddha and Unani) [1, 2]. This plant was widely used by all sections of the society whether directly as folk remedies or indirectly as pharmaceutical preparation of modern medicine [3]. Pharmacological screening of compounds of natural or synthetic origin has been the source of innumerable therapeutic agents. Random screening as tool in discovering new biologically active molecules has been most productive in the area of antibiotics. Medicinal plants represent a rich source of antimicrobial agents. Studies by various researchers have proved that plants are one of the major sources for drug discovery and development [4]. Plants are exploited as medicinal source since ancient age. The traditional and folk medicinal system uses the plant products for the treatment of various infectious diseases. About 75%of the Indian population relies heavily on the use of herbal drugs for the treatment of diseases [5].

Calotropis gigantea (**Fig. 1**) is a xerophytic, erect shrub, growing widely throught the tropical and subtropical regions of Asia, and Africa. Two varieties of the plant are described

by Sanskrit writer, the white flowered. Tribal people were using this plan parts to cure several illness such as tooth ache, carache, sprain, anxiety, pain, epilepsy, diarrhea and mental disorders.

Datura metel L (**Fig. 2**) particularly the leaves and seeds are used as anesthetic, anodyne, anti-asthamatic, anti-pasmodic, anti-tussive and Hallucinogenic. The plant finds application in the treatment of diarrhea and skin disease.

Fig. 1: ***Calotropis gigantea***

Fig. 2: ***Datura metel L***

MATERIAL AND METHODS

Plant collection and extraction

The sensitive plant *Calotropis gigantea L.* and *Datura metel L.* were collected from kolli hills, Namakkal District. The fresh plants were collected in polythene bag and brought to the laboratories. First it washed with tap water, then surface sterilized in 10 per cent sodium hypochlorite solution to prevent the contamination of any microbes, then rinsed with sterile distilled water and air dried in shade at room temperature the samples were ground into a fine powder.

Preparation of plant extract

Forty grams of the powdered leaves were loaded in Soxhlet apparatus and fractionated in 125 mL of (Chloroform, Acetone and Ethanol) solvent. The fraction was evaporated at rotary evaporator at 40°C [6].

Phyotochemical activity of *Calotropis gigantea* (Linn.) and *Datura metel* (Linn.)

The different phytochemical analysis of this method of [7, 8].

Test pathogens

The test bacterial pathogens namely *Staphylococcus aureus, Escherichia coli, , Bacillus spp, Salmonella spp, Klebsiella* were collected in P G and Research Department of Microbiology, Selvamm Arts and Science College Namakkal, Tamilnadu, India.

Maintenance of test pathogenic culture

Nutrient agar slants were used to maintain the test pathogenic culture were inoculated in the slant by streaking and were incubated at 37°C for 24 hours and then stored at 4°C for further analysis.

Antibacterial activity

In the preliminary screening, the effect of different crude extracts of *Calotropis gigantea* (Linn.) and *Datura metel* (Linn.) leaf on bacterial growth was determined by Disc diffusion method [9]. The test cultures were swabbed on Mueller-Hinton agar plates, within 15 min after adjusting the inoculums suspension. The swab was rotated several times and pressed firmly on the inside wall of the tube above the fluid level and removed the excess inoculums from the swab. The dried surface of a Mueller-Hinton agar plate was inoculated by streaking the swab and the entire sterile agar surface. This procedure was repeated by streaking two more times, rotating the plate approximately 60° each time to ensure an even distribution of inoculums. As a final step, the rim of the agar was swabbed. The concentration (100µg, 200µg and 300µg) of the sterile each extract and standard antibiotic (Gentamicin 10 µg) were placed in the surface of appropriate medium. The plates were incubated in an upright position at 37°C for 24 h. The diameter of inhibition

zones were measured in mm and the results are recorded.

RESULTS

The beneficial medicinal effects of plant materials typically result from the secondary products present in the plant although, it is usually not attributed to a single compound but a combination of the metabolites. The medicinal actions of plants are unique to a particular plant species or group, consistent with the concept that the combination of secondary products in a particular plant is taxonomically distinct [10].

Qualitative preliminary phytochemical analysis of *Calotropis gigantea L* and *Datura metel L*. was done in standard procedures (**Table 1**). The three solvent extracts of consists of carbohydrates, alkaloids, proteins, amino acids, saponins, tannins and phenols, flavonoids. Phytosterols and Terpenoid.

Table 1: Phytochemical Screening of *Calotropis gigantea L* and *Datura metel L.*

S. no	Phytochemical	*Calotropis gigantea*			*Datura metel*		
		Chloroform	Acetone	Ethanol	Chloroform	Acetone	Ethanol
1	Alkaloid	-	+	-	-	+	+
2	Terpenoid	+	-	-	+	+	-
3	Flavonoid	+	+	+	+	+	+
4	Steroid	-	+	+	-	-	-
5	Tannin	-	+	-	+	-	+
6	Saponin	+	-	+	-	-	+
7	Carbohydrate	-	-	+	+	+	-
8	Protein	+	-	+	-	-	+
9	Amino acid	+	+	-	-	+	-
10	Anthroquine	-	-	+	+	-	-

The antimicrobial properties of *Calotropis gigantea L* plant materials have been evaluated *in vitro* against *Staphylococcus aureus, Escherichia coli, Bacillus spp, Salmonella spp, Klebsiella.* However, the ethanol extract of plant showed highest inhibition against *Staphylococcus aureus, Escherichia coli, Salmonella spp, Klebsiella* in 300µg (**Table 2**).

Table 2: Antimicrobial activity *Calotropis gigantea L.* (Disc diffusion method)

S.no		Zone of inhibition (mm)									
		Chloroform			Acetone			Ethanol			Gentamicin
	Test organisms	100 µg	200 µg	300 µg	100 µg	200 µg	300 µg	100 µg	200 µg	300 µg	10 mg/ disc
1	*Staphylococcus aureus*	-	12	13	-	8	13	8	12	16	19
2	*Escherichia coli*	-	8	20	-	-	8	6	10	16	18
3	*Bacillus spp*	-	6	11	-	4	12	-	9	10	20
4	*Salmonella spp*	-	-	10	-	-	14	-	8	12	10
5	*Klebsiella*	-	-	-	9	10	13	-	-	12	16

Datura metel L antimicrobial activity in Ethanol and acetone against *Staphylococcus aureus, Escherichia coli, Bacillus spp, Salmonella spp* (**Table 3**).

Table: 3 Antimicrobial Activity *Datura metel L.*

S. No	Test organisms	Zone of Inhibition (mm)									
		Chloroform			Acetone			Ethanol			Gentamicin
		100 µg	200 µg	300 µg	100 µg	200 µg	300 µg	100 µg	200 µg	300 µg	10mg disc
1	*Staphylococcus aureus*	-	12	16	-	9	14	6	12	18	19
2	*Escherichia coli*	-	-	10	10	14	15	-	10	16	18
3	*Bacillus spp*	-	-	14	-	6	12	-	8	11	20
4	*Salmonella spp*	-	-	8	9	10	16	-	8	10	10
5	*Klebsiella*	6	10	14	-	8	14	-	-	12	16

DISCUSSION

The medicinal plants have provided a source of inspiration for novel drug compounds as plants derived medicines have made significant contribution towards human health [11, 12]. Some bacteria posses mechanism for converting substance toxic to it into non-toxic substances. *Staphylococcus aureus* and other species produce the enzyme penicillinase, which convert penicillin to penicillinic acid which could not inhibit its growth. [13]. We have compared our results with the use of the plants as previously reported in traditional medicine [14] 2 plant species which were active or slightly active against one or several of the micro organisms.

The antimicrobial activity of *Datura metel* leaves against bacteria. The diameter of inhibition zone recorded in *Escherichia coli* was 18 mm and 16 mm of Acetone and Ethanol. These differences may be attributed due to presence of antibacterial component in high concentration in local variety enhancing the medicinal importance of indigenous essential oil [15].

CONCLUSION

The study of antimicrobial activity of herbal plant extract of *Phyllanthus amarus*, *Calotropis gigantea* and *Datura metel* showed that the ethanol extract shows promising antimicrobial activity against bacterial and fungal human pathogens when compared to acetone extract. The results also indicated that scientific studies carried out on medicinal plants having traditional claims of effectiveness might warrant fruitful results. These plants could serve as useful source of new antimicrobial agents.

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