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PHYTOCHEMICAL AND ANTIMICROBIAL STUDIES OF EXTRACTS OF *SOLANUM XANTHOCARPUM*

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ABSTRACT: Antibacterial activity pf various parts (stem, leaf and fruits) of solvent extracts (petroleum ether, alcohol and acetone) of *Solanum xanthocarpum* against *Escherichia coli, Klebsiella pneumoniae, Salmonella typhi* and *Bacillus cereus* were detected by zone of inhibition. The extracts of *Solanum xanthocarpum* showed high sensitivity to *Kiebsiella pneumoniae* and *Salmonella typhi,* moderate sensitivity to *Escherichia coli* and less sensitivity and resistant to *Bacillus cereus.* In control, there is no inhibitory zone observed.

INTRODUCTION

The medical plants have been used to cure disease since antiquity. Plants still constitute one of the major sources of drug in modern as well as traditional medicine throughout the world (1). The bioactive substances in plants are produced as secondary metabolites. *Solanum xanthocarpum* is an important medicinal plant belonging to Solanaceae family. It is used to cure various diseases like gonorrhoea, rheumatism, cough, asthma, catarrhal fever and sore throat.

Proteins, Carbohydrates, Vitamin C, Anthocyanin and Solasonine were reported in *Solanum xanthocarpum* (2). The alcoholic and aqueous extracts of the plant showed hypotensive effect, antiviral activity against Ranikhet disease virus and also against Sarcoma 180 in mice (3). The alcoholic extract of *Solanum xanthocarpum* showed contraceptive properties in male rats (4). There were no reports for antibacterial studies on *Solanum xanthocarpum.* Hence an attempt has made by the authors to study antibacterial activity of *Solanum xanthocarpum.* The present study has been undertaken to determine the antibacterial effect of extracts of various parts of *Solanum xanthocarpum.*

MATERIALS AND METHODS

Collection of Medicinal Plant

The medicinal plants *Solanum xanthocarpum* was selected and their parts like stem, leaf and fruit were collected around Kattiyankuppam Village at Cuddalore District, Tamil Nadu, India. The collected plant materials were brought to the laboratory for the study of antimicrobial activities and phytochemical analysis.

Preparation of extracts

The collected parts (stem, leaf and fruits) of the medicinal plant were cleaned and dried under shade. The dried plant materials were then ground well to fine powder. Powdered plant materials were successively extracted with petroleum ether, alcohol and acetone (60

– 80^0 C) using soxhlet extractor. The extraction was continued for 24 hours. The petroleum ether, alcohol and acetone extracts were then filtered and kept in oven at 40^0 C for 24 hours to evaporate the solvent from it. Greenish brown and greenish black residues were obtained. The solid fractions were redissolved in dimenthyl formamide (DMF) which were used to determine antibacterial activities (5). DMF is an inert organic solvent.

Selection of Microorganisms

Escherichia coli (gram negative), *Klebsiella pneumoniae* (gram negative), *Salmonella typhi* (gram negative) and *Bacillus cereus* (gram positive) were used for the study of antibacterial activity. The bacterial cultures were maintained on slants consisting of nutrient agar medium. 24 hours cultures of *Escherichia coli, Klebsiella pneumoniae, Salmonella typhi, Bacillus cereus* were used in the antibacterial screening.

Phytochemical Analysis

The plant extracts were subjected to various qualitative chemical tests to determine phytochemical constituents which are present in them.

Antimicrobial Testing

5% w/v test solution of each extract was prepared by dissolving 250 mg of each extract separately in 5 ml of dimethyl formamide (DMF).

Nutrient agar medium was prepared and sterilized by an autoclave. In an aseptic room, they were poured into sterile petridishes to a uniform depth of 4 mm and the allowed to solidify at room temperature. After solidification, the test organisms were inoculated with the help of a sterile swab soaked in bacterial culture or suspension. This provides the uniform surface for growth of bacterium and is used for antibacterial sensitivity studies. Then the sterile filter paper discs (6mm) containing samples (100 ul) were immersed in plant extracts and placed over the solidified agar in such a way that there is no overlapping of zone of inhibition. Plants were kept at room temperature for half an hour for diffusion of the sample into the agar media. The organism inoculated pertridishes were incubated at 37^0 C for 48 hours. After the incubation period is over, the zone of inhibition produced by the sample with different organism in different plates were measured and recorded immediately by using a zone reader (5).

RESULTS AND DISCUSSION

Phytochemical constituents of *Solanum xanthocarpum* like alkaloids, carbohydrates, phytosterols, sterols, tannins, proteins, amino acids, saponins, fixed oils, fats and flavonoids were analysed qualitatively and reported in Table 1. The phytochemical screening showed in all cases the presence of alkaloids, carbohydrates, phytosterol, sterols and flavonoids. Saponins were absent in all cases.

Antibacterial activity of various parts of extracts *Solanum xanthocarpum* were studied by measuring the zone of inhibition formed around the disc and the results are given in Table 2. Depending on the measured values of the complete inhibition diameter of the circle including the disc the millimeter, the antibacterial activity can be classified into highly sensitive (712mm), moderately sensitive (9-12mm), less sensitive (6-9 mm) and resistant (<6mm) as reported by Arora and Bharadwaj (6). From the above findings the extracts of *Solanum xanthocarpum* showed high sensitivity to *Klebsilla pneumoniae and Salmonella typhi*, moderate

sensitivity to *Escherichia coli* and less sensitivity and resistant to *Bacillus cereus.*

Alkaloids and flavonoids found in the tested parts of plant qualitatively may be responsible for their antibacterial activities. Similar type of results was also reported by Binutu (7) in some leguminaceae plants. In the present study, the results confirm the antibacterial potential of the plant. Several tannins, flavonoids and saponins have been reported to have antibacterial properties (8,9,10). So the antibacterial activity shown by the extracts of *Solanum xanthocarpum* might be due to some antimicrobial substances present in them.

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Table 1

Phytochemical Analysis of Various Parts (Stem, Leaf and fruits) of Extracts

(Petroleum Ether, Alocohol) of Solanum xanthocarpum.

S. No.	Extracts		Alkaloids	Carbohydr-ates	Phytosterol and sterols	Tannins	Protiens and amino acids	Saponins	Fixed oil and facts	Flavonoids
	Parts of Plant	Solvent								
1	Stem	Petrolium ether	+	+	+	-	+	-	-	+
		Alcohol	+	+	+	+	+	-	-	+
		Acetone	+	+	+	+	+	-	-	+
2	Leaf	Petrolium ether	+	+	+	-	+	-	+	+
		Alcohol	+	+	+	-	-	-	-	+
		Acetone	+	+	+	-	+	-	-	+
3	Fruit	Petrolium ether	+	+	+	+	-	-	+	+
		Alcohol	+	+	+	-	+	-	-	+
		Acetone	+	+	+	-	+	-	-	+

Table 2

Antibacterial Evaluation of Various Parts (stem, Leaf and Fruits) of Extracts

(Petroleum ether, Alcohol and Acetone) of Solanum xanthocarpum.

S.No	Strains of Microorganisms	Diameter of zone of inhibition (mm)										
		Stem			Leaf			Fruits			Standred	Blank
		Petrolium ether	Alcohol	Acetone	Petrolium ether	Alcohol	Acetone	Petrolium ether	Alcohol	Acetone		
1	*Bacillus*	9	0	0	8	10	0	8	0	0	22	0
2	*Escherichia coli*	7	13	11	7	8	8	13	8	11	25	0
3	*Klebsiella Pneumoniae*	18	21	17	20	21	20	23	24	28	28	0
4	*Salmonella typhi*	12	11	14	13	11	13	0	12	13	27	0

Solvent control does not produce zone of inhibition