



Flower Extracts of *Quisqualis Indica* as Novel Antibacterial Agent against some Pathogenic Bacteria

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Abstract

Quisqualis indica is an impressive tropical ornamental vine. The present study was focused on elucidating the antibacterial potentiality of the crude extract and different solvent extracts of flowers of *Q. indica* using agar well diffusion method against pathogenic bacteria *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Bacillus subtilis*. Petroleum ether extractive of flowers showed the best result against the test bacteria. In case of gram positive bacteria *S. aureus* and *B. subtilis* inhibition zones of 26 mm and 23 mm was seen respectively and in case of gram negative bacteria 20 mm and 22 mm of inhibition zone was seen against *E. coli* and *P. aeruginosa* respectively at a concentration of 50 mg/ml. Secondary phytochemicals like alkaloids, steroids, flavonoids and phenols were detected. The MIC values were 27.0, 30.0, 38.0 and 40.0 µg/ml for *S. aureus*, *E. coli*, *P. aeruginosa* and *B. subtilis* respectively. Hence the petroleum ether extract of *Q. indica* flowers may be treated as a novel source in producing effective antibacterial agent.

Keywords: *Quisqualis indica*; Antibacterial activity; Minimum inhibitory concentration

Introduction

The arbitrary consumption of immunosuppressive drugs, antibiotics with huge side effects is worsening the situation day by day. So there is a need to search for new eco-friendly strategies to manage microbial infections with minimal ecological hazards. India is the home town of largest medicinal herbs and more than 6,000 medicinal plants have been used in primary healthcare [1]. Nowadays researchers have studied the antibacterial properties of various botanicals against different pathogenic bacteria [2-4]. The present study was carried out to investigate the antibacterial property using an ethno pharmacologically important plant, *Quisqualis indica* (Linn.) commonly known as rangoon creeper under laboratory condition. It is an ornamental plant but due to presence of various secondary phytochemicals it also lights off in traditional medicines over long period of time. Decoctions of the roots, seeds and fruits used as antihelmintic, fruit decoction for gargling; leaves to relieve pain caused by fever and flowers are used to relieve headache [5]. This is the first ever attempt to control the aforesaid bacteria with the extracts of *Q. indica* flowers as per literature review is concerned.

Materials and Methods

The flowers of *Q. indica* were precisely collected from Burdwan district (23°16'N, 87°54'E), WB, India. They were taxonomically legitimated by Prof. A. Mukherjee, Department of Botany, The University of Burdwan, Burdwan. A herbarium (Voucher No: GCZD-13) has been deposited in the Mosquito, Microbiology and Nanotechnology Research units, Department of Zoology, The University of Burdwan.

Four bacterial strains namely, *Bacillus subtilis* MTCC 441, *Staphylococcus aureus* MTCC 2940, *Escherichia coli* MTCC 739 and *Pseudomonas aeruginosa* MTCC 2453 were collected from repository of Mosquito, Microbiology and Nanotechnology Research Units, Parasitology Laboratory. At 37°C bacteria were cultured in nutrient broth Hi-Media, M002 (Hi-Media Laboratories Limited Mumbai, India) and maintained on nutrient agar slants at 4°C with regular periods of subculture.

Antibiotic discs (Span Diagnostics Limited, Surat, India) Gentamycin (10 g), Norfloxacin (10 g), Ampicillin (10 g), PenicillinG (10) and Cloxacillin (10) were used during the present experiment.

Fresh flowers of *Q. indica* were cleaned in tap water and soaked on a paper towel. Afterwards they were minced by mechanical grinder and the liquid was filtered by Whatman's no-1 filter paper. The filtrate was considered as a stock solution (100% concentration) for the experiment. The

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Table 1: Susceptibility of bacterial strains against some commercially antibiotics.

Antibiotics (µg/ml)	Diameter of inhibitory zones (mm)			
	<i>S.aureus</i>	<i>E.coli</i>	<i>P. aeruginosa</i>	<i>B. subtilis</i>
Gentamycin (10)	13	17	7	18
Norfloxacin (10)	20	11	8	2
Ampicillin (10)	18	2	14	0
PenicillinG (10)	22	15	0	0
Cloxacillin (10)	0	0	0	0

Table 2: Antimicrobial sensitivity assay of crude and solvent extracts of flowers of *Quisqualis indica*.

Flower extracts	Diameter of the inhibitory zones (mm)			
	<i>S.aureus</i>	<i>E.coli</i>	<i>P. aeruginosa</i>	<i>B. subtilis</i>
Crude extract of flower (1 ml)	20	18	21	19
Petroleum ether extracts of flower (50 mg/ml)	26	20	22	23
Chloroform: methanol (1:1 v/v) extracts of flower(50 mg/ml)	8	2	12	14
Sterile distilled water	0	0	0	0
Dimethylsulphoxide	0	0	0	0

Table 3: Minimum inhibitory concentration of bioactive fraction of petroleum ether from flowers of *Quisqualis indica*.

Bacterium	M.I.C. Value (µg/mL)
<i>S.aureus</i>	27.0
<i>E.coli</i>	30.0
<i>P. aeruginosa</i>	38.0
<i>B. subtilis</i>	40.0

concentrations (0.5, 1.0, 1.5, 2.0 and 2.5 ml) were set up by adding distilled water with the stock solution.

For solvent extraction, standard method was followed [6]. Two different solvents viz. petroleum ether and Chloroform: methanol (1:1v/v) were used. Elutes were collected from chamber and made concentrated through evaporation in a rotary evaporator. The extractives were preserved at 4°C in a refrigerator for further bioassay.

Antibiogram was done by disc diffusion method (NCCLS, 1993) with commonly used antibiotics. The antibacterial assay was conducted by agar well diffusion method [7]. DMSO was taken as control for solvent extracts and sterile distilled water was taken as control for crude extract. The plates were incubated for 24h at 37°C. Antibacterial activities were evaluated by measuring inhibition zone. All the given data are calculated by taking the average value of three sets of observations.

MIC was determined by dilution method as described by National Committee for Clinical Laboratory Standards. Phytochemical tests of flowers of *Q. indica* were done according to the standard method of Sofowara [7-10].

Statistical analysis

The results are presented as mean ±SD. The data were analysed by using Excel and Easy plot software.

Results and Discussion

Table 1 depicts the antibiogram assay of the test Gram positive and Gram negative bacterial strains against commonly used antibiotics. The trend of susceptibility of bacterial strains to crude

Table 4: Secondary phytochemical constituents of petroleum ether extracts of flowers of *Q. Quisqualis indica*.

Plants Name	Alkaloids	Terpenoids	Steroids	Flavonoids	Tannins	Phenols
<i>Quisqualis indica</i> flower	+	-	+	+	-	+

+ = Present

- = Absent

extracts of flower was *P. aeruginosa* > *S.aureus* > *B. subtilis* > *E.coli*. The petroleum ether extract exhibited maximum antibacterial activity against the test bacteria (Table 2). The MIC values are presented in (Table 3). Detected secondary phytoconstituent of petroleum ether flower extract have been described in (Table 4). Further bioactive fraction is yet to be disclosed. Treatment of microbial infection is done through decoction of the plant extracts in the traditional method. In the present study, extract prepared with organic solvent (Petroleum ether showed highest activity) has revealed to provide an enhanced antibacterial activity which is noteworthy. In vivo study on this medicinal plant is essential to see toxicity of the active compound, their side effects and diffusion in different body parts. However, only a few botanicals have been stimulated from the laboratory to field use, due to poor characterization and restriction of proper screenings.

Conclusion

Petroleum ether extract of *Q. indica* has been proved to be a bioactive antibacterial agent. Isolation of individual compounds and their biological activities required to be uncovered to enhance its pharmacological importance in the field of research.

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