



Evaluation of Antibacterial activity of *Hibiscus rosa-sinensis* flower extract against *E. coli* and *B. subtilis*

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ABSTRACT: The study was aimed at evaluating the antibacterial activity of the aqueous and solvent extract of Red flowers of *Hibiscus rosa-sinensis*. The extract contains large amounts of phenolic compounds and flavonoids. The aqueous and solvent extracts of flowers of *H. rosa-sinensis* were screened for antibacterial activity by using disc diffusion method. The flower material can be taken as an alternative source of antibacterial agent against the human pathogens.

Key words: Antibacterial activity, human pathogens, Flavonoids, phenolic compounds.

INTRODUCTION

The plants *Hibiscus rosa-sinensis* belongs to the family Malvaceae. With attractive and colorful flowers, plants of Hibiscus are widely planted as ornamentals and are used in traditional medicine. Hibiscus species have been used as a folk remedy for the treatment of skin diseases, as an anti fertility agent, antiseptic and carminative. Hibiscus Rosa sinensis possesses many biological activities such as antipyretic, analgesic and anti-inflammatory activities (1, 2). It has also been reported that the plant's flower possesses anti-spermatogenic, androgenic, anti-tumor and anticonvulsant properties, in addition, the leaves and flowers have been found to be aid in the healing of ulcers. Infusion of the petals is given as refrigerant and demulcent. Many chemical compounds like Cyandin, Quercetin, Hentriacontane, Calcium oxalate, Thiamine, Riboflavin, niacin and ascorbic acids have been isolated (3, 4).

Resistance towards revealing antibiotics having become widespread among bacteria and fungi hence new class of antimicrobial substances are urgently required. There are several studies which reveal the presence of such compounds with antimicrobial properties in various plant parts. The petals have some protective mechanism against microbial attack in most of the plants (5). The *Hibiscus rosa-sinensis* flower petals of a large number of plant species growing in the vicinity of our environment were screened for their antibacterial activity.

The present study reveals that the evaluation of antibacterial activity in flower extract of *Hibiscus rosa-sinensis* against human pathogens viz. *Escherichia coli* and *Bacillus subtilis*.

MATERIALS AND METHODS

Collection of samples: First of all flowers of *Hibiscus rosa-sinensis* collected and rinsed with distilled water and shade dried. After that homogenized into fine powder and stored in air tight bottles.

A. Extraction of components

Aqueous Extraction: Air dried powder of flower of *Hibiscus rosa-sinensis* is taken and weighed 4 g of powder was boiled in 100 ml distilled water and filtered with Whatman filter paper no. 1. The filtrate was collected and then stored at 5°C.

Solvent Extraction: 4g air dried powder of flower of *Hibiscus rosa-sinensis* was placed in 100 ml of organic solvent Hexane in plugged conical flask. After that it was kept in a rotary shaker at 190-220 rpm for 24 hrs. Then filtered and centrifuged it at 10000 rpm for 5 min. The filtrate was collected and the solvent was evaporated by solvent distillation apparatus. It was then stored at 40°C in air tight bottles for further study.

B. Test microorganism for antibacterial assay

For the in vitro antibacterial assay the following human bacterial were studied such as *E. coli* *B. subtilis*.

Culture preparation for antibacterial assay: First of all culture were prepared. For this, cultures were grown on nutrient agar at 34°C for 18 h and the colonies were suspended in saline (0.75% NaCl) and its turbidity was adjusted to 0.5 Ma Farland Standards (108 CFU/ml). This saline culture prepared was used to inoculate the plates.

C. Antibacterial assay

Disc Diffusion: In this method aqueous and organic flower extract were introduced into a disc 0.5 mm (hi-media) and then allowed to dry. The disc was completely saturated with the test compound at concentration of 40 mg/ml. Then this disc was placed directly on the surface of Muller Hinton agar plates swapped with the test organism and the plates were incubated at 34°C for 24h.

D. Statistical Analysis

The results were analyzed by using standard deviation (SD) statistical method.

Table 1: Antibacterial activity of aqueous extract of solvent extract of *H. rosa-sinensis* in disc diffusion method (Mean+SD) (mm).

Test Organism	Disc diffusion method	
	Aqueous extract	Solvent extract
<i>B. subtilis</i>	15.00 + 2.81 mm	19.86 + 0.15 mm
<i>E. coli</i>	12.50 + 01.81 mm	18.00 + 1.53 mm

The extracts of the flower of *Hibiscus rosa-sinensis* containing multiple organic components including flavonoids, tannins, alkaloids, terpenoids all of which are known to have antibacterial effects (6). These extracts also contain phenolic compounds like tannins that are very good antimicrobial agents.

Medicinal plants provide accessible and culturally relevant sources of primary health care. The remedies based on these plants after have minimum side effect. The bioactive substances in plants are produced as secondary metabolites, which may not only be development stage specific but also organ and tissue specific (7). Secondary metabolites belonging to polyketide and non ribosomal peptide families constitute a major class of natural products with diverse biological functions and they have a variety of pharmaceutically important properties.

The antibacterial activities of *Hibiscus rosa-sinensis* flowers were carried out. The flower extract shows an antibacterial activity against the human pathogens such as *E. coli* and *B. subtilis* (8). The inhibition of bacterial growth in-vitro by the extracts of flower could be due to the presence of some active compounds in the extracts. These active compounds may act alone or in combination to inhibit bacterial growth (9). There are several reports published on antibacterial activity of different herbal extracts. (10, 11, 12).

In present work flower extracts of *Hibiscus rosa-sinensis* were screened for antibacterial activity against human pathogenic bacterial strains. *E. coli* are a common member of the normal flora of large intestine (13, 14). It is predominant facultative organism in the gastrointestinal tract and colonizes the tract. It is responsible for causing diarrhea. Thus the flower extracts can be used as an important antibiotic to cure disorders caused by the different strains of bacteria

RESULTS AND DISCUSSION

The result showed that aqueous extraction illustrated a maximum zone of inhibition against *Bacillus subtilis* (*B. subtilis*) *Escherichia coli* (*E. coli*) viz. (15.00 + 2.81), (12.50 + 1.81) mm.

Solvent (Hexane) Extract showed the highest zone of inhibition recorded against *B. subtilis* and *E. coli* as (19.86 + 0.15), (18.00 + 1.53) mm.

Antibacterial activity of aqueous extract and solvent (Hexane) extract of flower of *H. Rosa sinensis* in disc diffusion method are shown in Table 1.

(15, 16). The present studies conclude these extract could inhibit human pathogens growth. The results are good as well as the most active extracts can be subjected to isolation of the therapeutic antimicrobials and undergo secondary pharmacological evaluation.

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