



ASSESSMENT OF ANTIBACTERIAL POTENTIALITY OF *Clitoria ternatea* AGAINST SOME PATHOGENIC BACTERIA

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ABSTRACT

An attempt was made to analyze the antibacterial potentiality of a medicinal plant *Clitoria ternatea* leaf extracts against human pathogens namely *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The antibacterial study was conducted using the agar well disc diffusion method by using n-hexane, benzene, methanol, ethanol, and aqueous extracts. Largest inhibition zone diameter was observed in methanol extracts against all bacteria whereas least inhibition zone diameter was recorded against water extract. The study demonstrates that the selected plant is a potentially good source of antibacterial against the bacteria. Phytochemical analysis further needed to elucidate the components responsible for this activity.

Keywords: Antibacterial activity, *Clitoria ternatea*, pathogenic bacteria, Agar well diffusion method

INTRODUCTION

The trend of using natural products from plant extracts leads to new drug discoveries and for the presence of antimicrobials [1-3].

Clitoria ternatea Linn. is a perennial leguminous herb. The plant has been used since ancient time as widely as a memory enhancer, antidepressant, antistress, sedative

agent, anxiolytic and tranquilizing agent [4]. The present article deals with the examination of *C. ternatea*, for their antibacterial activities against selected four pathogenic strains of bacteria causing disease in human beings.

MATERIALS AND METHODS

Aerial parts of mature leaves of *C. ternatea* collected from the outskirts of Hatgobindapur, Burdwan, West Bengal, India. The plant was identified by Department of Botany, DBNDS Mahavidyalaya, under voucher no. DBNDSMB21112. The leaves were initially rinsed with distilled water and dried on paper towels in the shade, pulverized by a mechanical grinder, and stored in airtight glass containers.

For extraction, non-polar to polar solvents were used namely n-hexane, benzene, methanol, ethanol, and water were used as solvents. Ten gram of the dried powdered plant materials were soaked in 100 ml of solvents contained in conical flasks stoppered with rubber corks and left for 21 days with repeated shaking for at least 1 hour daily. The extracts were then filtered by using Whatman No. 1 filter. The residual extracts were stored in a desiccator until further use [5].

Four bacterial strains were used for the study. Gram-positive bacteria include *S. aureus* MTCC 2940 and *B. subtilis* MTCC 441, and Gram-negative bacteria include *E. coli* MTCC 739 and *P. aeruginosa* MTCC 2453. The strains are reference strains and were collected from the Laboratory of DBNDS Mahavidyalaya, Department of Zoology previously purchased from MTCC, Chandigarh.

Ethical clearance for the study was obtained from IAEC, Approval No. 23/IAEC (06)/RNLKWC/2020, Dated 08.02.2020.

McFarland number 0.5 standard was prepared by mixing 9.95 ml 1% H₂SO₄ in distilled water and 0.05 ml 1% BaCl₂ in distilled water in order to estimate bacterial density [6].

By agar well diffusion method [7] the assay was conducted. The bacterial strains grown on nutrient agar at 37°C for 18 h were suspended in a saline solution (0.85% NaCl). The suspension was used to inoculate 90 mm diameter Petri (Borosil). 6 mm diameter wells were punched in the agar and filled with 50 µl of 2000 µg/ml extracts. The dissolution of the organic extracts was aided by 1% (v/v) DMSO and that of the aqueous extracts with water, which did not affect the growth of microorganisms, in accordance with our control experiments. Plates were

incubated in BOD incubator at 37°C for 24 h. Inhibition zone diameters were measured. The experiments were conducted thrice. DMSO was taken as a control for the organic extracts. Sterile distilled water was taken as a control for aqueous extract.

RESULTS AND DISCUSSION

In the study, among the extractions assayed, the yield of methanol (1.45%) extract of *C. ternatea* contained the higher soluble solids than those of benzene (1.20%), n-hexane (1.02%), ethanol (0.82%), and water (0.24%). DMSO solvent used as negative control. Oxacillin 10 µg/disc and Gentamycin 10 µg/disc used as positive control for gram positive and gram negative bacteria respectively. The results of inhibition zones produced in organic extracts and water extract together with the results of positive and negative control is presented in **Table 1**. The inhibition zone varied depending upon nature of solvent used. The largest diameter of inhibition zone was observed from methanol extracts against all bacteria

whereas least inhibition zone recorded against water extract.

The results indicate that the crude extracts *C. ternatea* studied showed antibacterial activities toward the Gram-positive bacteria (*S. aureus*). These results are almost similar to previous reports on plants with respect to Gram-positive bacteria [8]. Gram-negative bacteria (*E. coli*) was expected to be more resistant than the Gram-positive bacteria may be due to the permeability barrier provided by the cell wall or to the membrane accumulation mechanism [9].

Infections caused by multidrug-resistant bacteria, are among the most difficult ones to treat with conventional antibiotics [10]. It appears that the microorganisms were not as sensitive to the water extracts compared to the methanol extracts as determined by diffusion. The reason for this that all of the identified components from plants active against microorganisms [8].

Table 1: Inhibition zone diameter of extracts of *C. ternatea* against organic, water, positive and negative control

Extracts	<i>S. aureus</i>	<i>B. subtilis</i>	<i>E. coli</i>	<i>P. aeruginosa</i>
n-hexane	9±0.17	00.00±0.00	4±0.17	10±0.52
Benzene	10±0.52	00.00±0.00	6±0.52	12±0.11
Methanol	14.0±0.58	00.00±0.00	10±0.58	16±0.52
Ethanol	12.0±0.11	0.00±0.00	8±0.52	14±0.58
Water	8±0.52	00.00±0.00	0±0.52	8±0.52
Positive Control	22.0±0.52	18.0±0.35	18.0±1.15	24.0±0.11
Negative Control	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00

CONCLUSION

In conclusion, methanol and ethanol extracts of *C. ternatea* showed the highest antibacterial activity which indicates the presence of promising antibacterial compounds. Further phytochemical studies are needed to elucidate the active components.

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Authors Contributions

AD- Data Curation, Original Draft writing, Carry out Research work, IB, TD- Reviewing, Editing PPC- Designing, Monitoring, Reviewing, Communication

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