



Evaluation of biological activities of butterfly pea

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Abstract:

Clitoria ternatea have uncovered its potential therapeutic properties viz. anti-inflammatory, antioxidant, and neuroprotective effects. These attributes hold promise for the management of various health conditions. Furthermore, extracts derived from the plant find application in cosmetics and personal care products, owing to their antioxidant properties and potential benefits for the skin. Ongoing studies into the medicinal properties of *Clitoria ternatea* hint at its potential as a source of bioactive compounds for pharmaceutical development.

In the present study, aqueous and ethanol extract were prepared of all the parts viz. flower, fruits and leaves of *Clitoria ternatea* plant. The antimicrobial activity of the plant extract was conducted along with phytochemical tests. The plant's aqueous extract of flower part showed the maximum zone of the inhibition against *S. aureus*. Fruits and Leaves aq. extract showed minimum zone of inhibition against *S. aureus*. As of the plants aqueous extract of the flower and leaves showed no zone of inhibition against *E.coli*, the fruits showed maximum zone of inhibition against *E.coli*. For plant extracts against *klebsiella*, the aqueous extract of fruits showed maximum zone of inhibition compared to flower and leaves aq. extract. On analyzing the plant's ethanol extract against *Staphylococcus aureus*, it became evident that the flower displayed the widest inhibition zone, while no inhibition zone was observed in the fruits, and the leaves exhibited the smallest inhibition zone. Similarly, with the antimicrobial activity plant's ethanol extract against pathogens, the ethanol extract of flower part displayed a prominent inhibition zone against *E.coli*, *Klebsiella* and *S. aureus* as compared to leaves and fruits ethanol Extract.

Key words: *Clitoria ternatea*, antimicrobial activity, phytochemicals

INTRODUCTION

Clitoria ternatea, a member of the *Fabaceae* family, is among the cherished botanical treasures utilized throughout human history for various purposes such as therapy, religion, cosmetics, nutrition, and beautification (Senica *et al.* 2019). Known reverently as butterfly pea or blue pea flower, this perennial climber has left an indelible mark across cultures, identified as aparajita in Bengali, kajroti in India, cunha in Brazilian regions, fulacriqua in Portuguese, and lanhu die in Chinese. Beyond its ornamental significance, it holds a significant place in Southeast Asian traditions, where its blue flower pigment serves as a valued food colorant. Industrially, *Clitoria ternatea* offers valuable resources. Its blue flower pigment serves as a natural food colorant, replacing synthetic dyes in food and beverage products (Havananda and Leungwilai *et al.* 2019).

The clinical realm, research into *Clitoria ternatea* has unveiled its potential therapeutic properties, including anti-inflammatory, antioxidant, and neuroprotective effects (Chauhan *et al.* 2017). These properties could be beneficial in managing conditions such as neurodegenerative diseases, cardiovascular disorders, and inflammatory conditions. Moreover, ongoing studies into its medicinal properties suggest that *Clitoria ternatea* could be a source of bioactive compounds for pharmaceutical development. The leaves of *Clitoria ternatea* are pinnate, adorned with 5-7 leaflets, showcasing an elliptic-oblong shape. Its flat, linear, beaked seed pods offer an edible delight, while a robust taproot system defines the plant's structure (Kosai *et al.* 2015 & Mukharjee *et al.* 2008). Nutritional analysis of its flowers reveals a rich composition of protein, fiber, and essential minerals (Mukharjee *et al.* 2008 & Fantz 1991). Scientific scrutiny has further illuminated the potential health benefits of *Clitoria ternatea*, with various research endeavors exploring its therapeutic properties. Its story unfolds as a narrative of cultural significance, ecological contributions, and promising health applications, rendering it a botanical gem deserving of exploration and admiration.

Material and Method

The fresh and healthy plant leaves, flower and fruit of *Clitoria ternatea* were collected from Botanical garden of R. A. College, Washim. The plant leaves, flower and fruit were washed separately under running tap water to eliminate soil particles and then rinsed in sterile distilled water. The plant parts were shed dry at room temperature for 3 to 4 days. After drying, the plant parts were crushed in pestle and mortar to make powder. 1 gm. of powder was immersing in 9 ml. of sterilized distilled water and 70% ethanol respectively overnight for preparing aqueous and ethanol extracts. The plant extracts were subjected for antimicrobial activity against pathogens viz. *Escherichia coli*, *Klebsiella spp* and *Staphylococcus aureus* by Kirby- Bauer disc diffusion technique. The Preliminary Phytochemical analysis of both the Aqueous and ethanol extracts was subject to qualitative examination as per the Pharmacopoeia of India (IP).

RESULT AND DISCUSSION:

The current study explores the biological activity of the Butterfly Pea plant. Table 1 elucidates the findings on the antimicrobial activity of extracts derived from the Butterfly Pea plant. Notably, the diameter of the inhibition zones caused by these plant extracts exhibited significant breadth across all tested plates, including those containing *Staphylococcus aureus* (aqueous and ethanol extract), *Klebsiella* (aqueous and ethanol), and *Escherichia coli* (aqueous).

When analyzing the *Staphylococcus aureus*, the flower ethanol extract, displayed the widest inhibition zone, measuring 35mm, while no inhibitory zone was observed in the fruits, and the leaves exhibited the smallest inhibition zone at about 10mm. Similarly, with the *Klebsiella*, the flower ethanol extract, show the maximum inhibition zone of 31mm, with no inhibition zone detected in the fruits, and leaves exhibiting a minimum inhibition zone of approximately 14mm. Furthermore, in case of *Escherichia coli*, ethanol extract of flower displayed a prominent inhibition zone measuring 38mm, while the fruits exhibited an inhibition zone of about 18mm, and the leaves displayed a minimum inhibition zone of around 13mm. In contrast, in case of *Staphylococcus aureus*, flower aqueous extract showed a maximum inhibition zone of 10mm with no inhibition zone observed in the fruits. The leaves exhibited a minimum inhibition zone of about 10mm. The aqueous extract of flower and leaves showed no zone against *Escherichia coli* and *klebsiella*. However, 10 mm. zone was observed against *S. aureus*. On the contrary, the fruit aqueous extract showed 12 mm. zone against *Escherichia coli* and *klebsiella*. Hence, flower ethanol extract was found to possess prominent antimicrobial activity against the test pathogens.

Table:1.- Antimicrobial activity of butterfly pea plant extracts

Extract	Flower		Fruit		Leaves		Mean Zone of inhibition
	Aqueous	Ethanol	Aqueous	Ethanol	Aqueous	Ethanol	
Microorganism	Zone of inhibition in mm						
<i>Staphylococcus aures</i>	10	35	00	00	10	10	10.83
<i>Escherichia coli</i>	00	38	12	18	00	13	13.5
<i>Klebsiella spp.</i>	00	31	12	00	00	14	9.5
Average mean	3.33	34.6	8	6	3.33	12.33	11.27

Table 2. Represents the findings on the preliminary phytochemical characterization of plant extract. It is found that nearly all the test for the presence of phytochemical compounds viz. Carbohydrate, alkaloid, protien,tannin,gluacoside,saphonin,phenol,flavonoids,anthraquinones and resin show positive result for flower aqueous extract except for phenol, saphonin, anthraquinone and protien. However in case of ethanol extract anthraquinone, saphonine and phenol were absent.In case of fruit the aqueous extract show positive result for protein glycoside, and absent for carbohydrate, alkaloid, tannin, saphonin and phenol. Likewise in case of ethanol extract of fruit carbohydrate, alkaloid, tannin and saphonin test was negative. And in case of protein, glycoside showed positive result.In case of aqueous leaves extract carbohydrate, glycoside and resin shows positive result and in alkaloid, tannin, protien, saphonin, phenol, flavonoids and anthraquinone are negative. In case of ethanol leaves extract carbohydrate, protein, glycoside and resin are positive and for alkaloid, tannin, saphonine, phenol, flavonoids and anthraquinone are negative.

Table 2 :-phytochemical activity of different plant extract

Plants parts Test	Flower		Fruit		Leaves	
	Aqueous	Ethanol	Aqueous	Ethanol	Aqueous	Ethanol
Test for Carbohydrate	+ve	+ve	-ve	-ve	+ve	+ve
Test for Alkaloid	+ve	+ve	-ve	-ve	-ve	-ve
Test for Protein	-ve	+ve	+ve	+ve	-ve	+ve
Test for Tannin	+ve	+ve	-ve	-ve	-ve	-ve
Test for Glycoside	+ve	+ve	+ve	+ve	+ve	+ve
Test for Saponin	-ve	-ve	-ve	-ve	-ve	-ve
Test for Phenol	-ve	-ve	-ve	-ve	-ve	-ve
Test for Flavonoids	+ve	+ve	-ve	+ve	-ve	-ve
Test for Anthraquinones	-ve	-ve	-ve	-ve	-ve	-ve
Test for Resin	+ve	+ve	+ve	+ve	+ve	+ve

+ve :- Positive -ve: - Negative

Conclusion: From above result it is concluded that *Clitoria ternatea* flowers have antimicrobial activity against pathogenic bacteria suggesting its medicinal importance against infections caused by bacteria. The research should be focused on the isolation and purification of phytochemicals to design eco- friendly herbal drug.

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