PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL ACTIVITY OF *JACQUEMONTIA CAERULEA*

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ABSTRACT

The study was performed to examine the antibacterial activity of *Jacquemontia caerulea* against gram-positive bacteria like Staphylococcus aureus and gram-negative bacteria like Escherichia coli, Pseudomonas aeruginosa, Proteus mirabilis, and Vibrio cholera. The antibacterial activity of various extracts of the plant at different concentrations (5,10,15,20 µg/ml) o was investigated by using disc diffusion method. Phytochemical screening of extracts showed the presence of secondary metabolites like alkaloids, flavonoids, glycosides, saponins, tannins, and triterpenes. The extracts showed significant antibacterial activity. The maximum zone of inhibition was shown by methanolic extract at 20µg/ml concentration against Staphylococcus aureus. The antibacterial activity might be due to the presence of secondary metabolites.

KEYWORDS: *Jacquemontia caerulea*, antibacterial, gram-positive, gram-negative, phytochemical.

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INTRODUCTION

In the Indian system of medicine, we mostly depend on plant derivatives. Plants offer a large variety of secondary metabolites that play an important role in metabolic pathways. Some species of plants are used for particular diseases in a specific region, the same plant is used in different ailments in some other region [1]. Bacterial infections are one of the prominent causes of health problems[2]. Drug resistance to many pathogens has been reported in different countries [3]. However, the condition is alarming in both developed and developing countries because of the unselective application of antibacterial agents. Due to this situation, it is necessary to look for new antibacterial agents from other sources with minimal undesirable effects[4]. Since a long time ago, herbs have been used as medicines as they have been known to cure many diseases[5]. India has generous medicinal plant flora of about 2500 species. Among these 2000 to 3000 at least 150 species are commercially used on a large scale. The traditional Indian healers have always been appreciated by foreign researchers. Extraction and characterization of many active phytoconstituents from a variety of plants give rise to highly active profile drugs [6]. Presently, numerous antibiotics are resistant to bacteria due to improper prescribing and poor self-treatment practices[7]. The development of antibacterial agents aids to control the increasing residence of antibiotic resistance[8]. *Jacquemontia caerulea* a member of the Convolvulaceae family, also known as Sky blue cluster vine, is the fastest-growing plant twinning wine, with stems of 6 feet or more in length, flowers open facing the sun in the early morning. The flowers don't open on rainy days but open on dry days. This plant is geographically

distributed in Hyderabad, Bangalore, Delhi, Tamil Nadu, etc. The *Jacquemontia* species have been documented for the following pharmacological activities namely antioxidant, analgesic, and anticoagulant. Seeds of this family have carminative and purgative properties, juice can be used as an anthelmintic and detoxifier to purify the blood[9]. Further, a fruit decoction of the species can be used to treat cough and fevers and the stem can be ingested for the treatment of constipation, flatulence, and liver complaints [10]. Despite an extensive literature survey on the plant, not even single pharmacological activity has been documented. Moreover, the plant has been bestowed with several phytochemical constituents like alkaloids, flavonoids, phenols, and saponins. Hence in the present study, were selected *Jacquemontia caerulea* leaves for evaluation of the antibacterial activity.

MATERIAL AND METHODS:

Collection of plant material:

Jacquemontia caerulea was collected from a certified plant supplier and was authenticated by the Department of Botany Anwar ul Uloom College, New Mallepally, Hyderabad.

Preparation of plant extract:

Leaves of *Jacquemontia caerulea* were shade dried. The dried leaves were made into fine powder by using a domestic grinder. Then the powder was subjected to successive solvent extraction by using different solvents in the increasing order of polarity using a Soxhlet apparatus [11].

Phytochemical screening:

The phytochemical screening was performed by the method described by Khandelwal[12].

Evaluation of the antibacterial activity:

The antibacterial activity of leaf extracts was performed by the disc diffusion method. The extracts were tested on both gram-positive and negative bacteria [13].

RESULTS :

Result of phytochemical screening:

Screening of ethanol extract of *Jacquemontia carulae* leaves showed that there were several chemical compounds such as flavonoids, carbohydrates, alkaloids, and saponins, while hexane and chloroform extract contain steroids.

Results of antibacterial activity:

From the experimental results, it was shown that all the extracts had the maximum zone of inhibition at 20µg/ml. and the minimum zone of inhibition at 5µg/ml. Among them, acetone extract showed the extremely largest zone of inhibition against Staphylococcus aureus and vibrio cholera respectively and chloroform extract showed a moderate zone of inhibition against staphylococcus aureus and pseudomonas aeruginosa and the smallest zone of inhibition was exhibited by ethyl acetate and methanol as shown in table no.1 and fig.1.

Table no.1: Zone of inhibition of various extracts of *jacquemontia caerulea* leaves

S.no	Extract	Bacterial strain	5µg/ml	10µg/ml	15µg/ml	20µg/ml
1	Chloroform (JCCE)	Escherichia coli	11.4±0.4	13.3±0.24	15.6±0.4	17.4±0.27
		Vibrio cholerae	13.7±0.38	16.1±0.39	18.2±0.87	20.2±0.8
		Proteus mirabilis	11±0.62	13.7±0.54	15.6±0.89	17.8±0.65
		Pseudomonas aeruginosa	11.1±0.42	13.12±0.48	15.7±0.8	17.8 ±0.43
		Staphylococcus aureus	11±0.7	13.9±0.45	16.7±0.39	19.4±0.39
2	Acetone (JCAE)	Escherichia coli	11±0.65	13.7±0.55	12.5±0.54	14.8±0.65
		Vibrio cholerae	13.5±0.57	16.3±0.47	20.6±0.54	23.8±0.8
		Proteus mirabilis	10.34±0.66	11.76±0.48	12.7±0.65	13.45±0.57
		Pseudomonas aeruginosa	10.34±0.67	10.13±0.58	13.8±0.65	14.3±0.65
		Staphylococcus aureus	14.24±0.8	17.5±0.7	18.2±0.7	23.4±0.47
3	Ethyl acetate (JCEAE)	Escherichia coli	7.23±0.8	9.56±0.67	10.4±0.34	12.6±0.6
		Vibrio cholerae	8.6±0.56	11.6±0.70	14.6±0.56	17.45±0.6
		Proteus mirabilis	7.7±0.92	9.4±0.45	9.6±0.45	13.4±0.52
		Pseudomonas aeruginosa	10.3±0.70	11.3±0.34	12.6±0.78	14.5±0.74
		Staphylococcus aureus	13.45±0.5	17.4±0.65	23.5±0.45	23.4±0.46
4	Methanol (JCME)	Escherichia coli	7.23±0.6	8.7±0.62	11.5±0.32	13.4±0.6
		Vibrio cholerae	8.5±0.82	11.5±0.70	12.6±0.53	12.24±0.54
		Proteus mirabilis	8.7±0.91	9.4±1.25	11.2±0.3	13.5±0.42
		Pseudomonas aeruginosa	9.2±0.78	11.5±0.65	12.5±0.70	14.5±0.72
		Staphylococcus aureus	12.5±0.7	17.7±0.52	21.5±0.42	22.4±0.56

Table no.1

Fig no.1: Antibacterial activity of various extracts at different concentrations

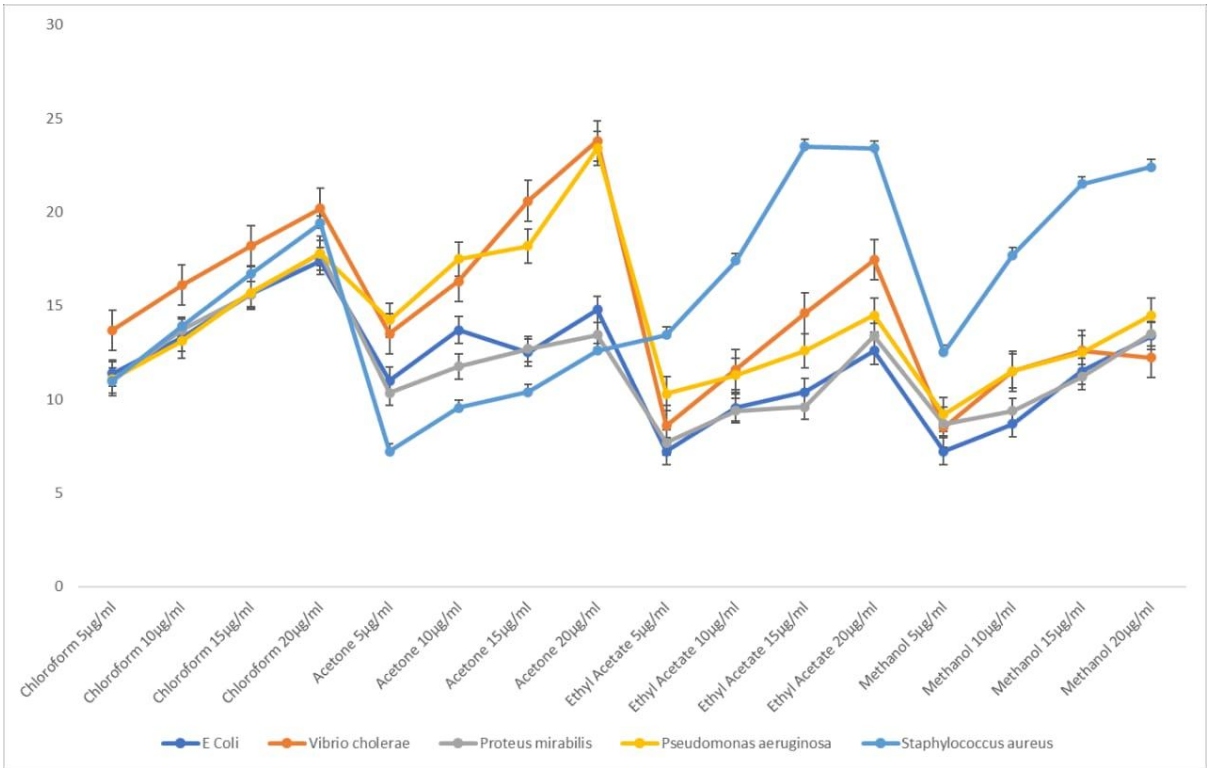

Fig.no.1

DISCUSSION:

In the present research work, the extracts of *Jacquemontia careulea* were screened for antibacterial activity. Almost all the extracts showed bactericidal effects against both gram-positive bacteria and gram-negative bacteria. *Jacuquemontia careulea* showed the presence of alkaloids, flavonoids, and saponins which are secondary metabolites that supported antibacterial activity and also act as defense mechanisms [14]. Alkaloids are known to have antibacterial antioxidants, antifungal, analgesic, anticancer, anxiolytic, and anticoagulant activities. As *Jacquemontia caerulea* contains alkaloids the antibacterial activity can be attributed to the presence of alkaloids as justified by their presence in other species of the plant. Flavonoids dissolve extracellular proteins and form protein complexes with the bacterial cell wall which results in the death of the bacteria. Saponins show antibacterial activity in pathogenic bacteria and fungi.

For the development of new natural therapeutic agents plants have been the major source. Some phytoconstituents of plant origin are certainly targeted against resistant pathogenic bacteria [15]. These metabolites possess a broad range of activities, which may help in protection against persistent diseases and suggest great potential for the plants as a source of useful phytomedicines. Microbial infections are the major cause of death worldwide. Indiscriminate use of antibiotics results in several negative impacts such as adverse effects on health, the killing of non-targetted bacteria, and the emergence of resistant strains of pathogenic bacteria. Crude solvent extracts and purified compounds from higher plants have shown to be promising alternatives for antibiotics with activity even against antibiotic-resistant bacteria [16]. In this study, extract of *Jacquemontia caerulea* was evaluated for antibacterial activity against gram-positive and gram-negative bacteria by the disc diffusion method. All the extracts

exhibited antibacterial activity because of the presence of secondary metabolites. Structural anatomical and physiological cell wall differentiation of gram-positive and gram-negative bacteria have an impact on the uptake of antibacterial drugs. Gram-positive bacteria are more susceptible to the impact on the uptake of antibacterial drugs. Gram-positive bacteria are more susceptible to the inhibitory effect because a single layer of peptide glycone can lack the natural sieve effect against chemicals, whereas gram-negative bacteria have multi-layered and complex cell wall structures which makes them less susceptible than gram-positive bacteria[17].

CONCLUSION:

In the present research work, the extracts showed antibacterial activity proven by the experimental results. Further studies can be conducted on the plant extracts by using fungal strains.

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