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Evaluation of Antimicrobial Activity of *Coldenia procumbens* Linn.

Babu S.[*1], Ambikapathy V.[2] and Panneerselvam A.[3]

Department of Botany & Microbiology, A.V.V.M. Sri Pushpam College,(Auto),Poondi Thanjavur, Tamil Nadu 613503, INDIA
E-mail: selvababunvk@gmail.com

ABSTRACT

Coldenia procumbens Linn. is a commonly available weed in cultivated field which is widely used in the codified Indian systems of medicine namely Ayurveda and Sidha. The aim of antimicrobial properties of the study is the *C.procumbens* whole plant extracts with some solvents (acetone, ethanol, methanol and water) used and inhibition of pathogenic bacteria and fungi. The test plant *C.procumbens* extracts with different concentrations (25, 50, 75 and 100µl) were used for antimicrobial activity against bacteria and fungi. The methanolic extracts showed maximum zone of inhibition against microbes such as *Bacillus cereus, Escherichia coli, Pseudomonas aeromonas, Staphylococcus aureus, Aspergillus sydowi, A.raperi, A. terreus* and *Fusarium* sp. in 100µl concentration when compared to other concentration and solvents. This significant results of *C.procumbens* exhibited very good source of antimicrobial property.

KEYWORDS: *Coldenia procumbens, bacteria, fungi, antimicrobial activity, solvents*

***Corresponding author**

S. Babu

Department of Botany & Microbiology,

A.V.V.M. Sri Pushpam College, (Auto), Poondi Thanjavur

E-mail: selvababunvk@gmail.com

INTRODUCTION

Plants with their wide variety of chemical constituents offer a promising source of new antimicrobial agents with general as well as specific activity[1]. Alternative systems of medicine viz., Ayurveda and Siddha medicine have become more popular in recent years. Scientist from divergent fields is investigating plants with a new eye for their antimicrobial usefulness and as an alternative source to existing drugs. During the last few decades, the global interest of various medicinal plants has increased rapidly due to their antibacterial and antioxidant activities, low toxicity and the potential to be a cheaper alternative to costly synthetic drugs[2]. The determination of antibacterial activities of different medicinal plants is of special interest these days due to the current global issue of increasing antibiotic resistance of microorganisms. It is assumed that the drug resistance in pathogenic microorganisms is developing due to indiscriminate use of commercial antimicrobial drugs. Antimicrobial resistance threatens the prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi. Therefore, it is highly imperative to determine compounds which can be used to develop novel medicines with higher antimicrobial properties.

Coldenia procumbens (Family: Boraginaceae) is a flat growing herb usually lying on the ground. Stems reaching 45cm, long shaggy branches often numerous young parts silky with white hairs. *Coldenia Procumbens* is found widely in south India and its leaves are applied to rheumatic swelling[3].This plant possesses pharmacogical properties of analgesic, antimicrobial, anti-inflammatory, antidiabetic, hepatoprotective and antioxidant activity.

MATERIALS AND METHODS

Plant Collection

Coldenia procumbens plants were collected from harvested paddy field of N.V Kudikadu, Thanjavur district, Tamilnadu, India. The plant *C.procumbens* was authenticated by Rapinat Harbarium St. Josesph's College, Trichy.

Figure 1. Coldenia procumbens plants

Preparation of plant extract

The whole plant materials were washed and shade dried. These dried materials are pulverized to attain a coarse powder. 25 gm of the plant material was extracted with different solvents (acetone, ethanol, methanol and aqueous)100ml using a Soxhlet apparatus for 5 hrs. The extracts were filtered through Whatman No.1 filter paper and stored in refrigerator. The extract was used for further studies.

Test microorganisms

The clinical microbes are *Bacillus cereus, Escherichia coli, Pseudomonas aeromonas, Staphylococcus aureus, Aspergillus sydowii, A.raperi, A.terreus* and *Fusarium* sp. were procured Doctor Diagonostic Center, Trichy and used for antimicrobial studies.

Screening for antimicrobial activity by well diffusion method[4]

The antimicrobial activity was carried out with 24hrsbacterial cultures of *Bacillus cereus, Escherichia coli, Pseudomonas aeromonas, Staphylococcus aureus* and 48 hrs fungal cultures (*Aspergillus sydowii, A.raperi, A.terreus* and *Fusarium* sp.) with different solvents of methanol, ethanol, acetone and aqueous extracts of *Coldenia procumbens* was tested separately using Agar well diffusion method. The Muller Hinton medium was sterilized by autoclaving at 120°C (15 lb/in^2) and poured10 ml of the medium with the respective plates to allow solidification. Then the plates were swabbed with bacteria and fungal strain individually inoculated and maintained. A well 6mm diameter was made using a sterile cork borer. The different concentration (25, 50, 75 and 100µl) of various solvents individually with the extracts was introduce in the well. The plates were incubated at 37± 2°C for 24hrs and antifungal assay plates were incubated at 28 ± 2°C for 48 hrs and every 24 hrs the results were recorded.

RESULTS AND DISCUSSION

The antibacterial activity of *C.procumbens* with different solvents like methanol, ethanol, acetone and aqueous plant extracts of *Coldenia procumbens* using agar well diffusion method by measuring the diameter of zone of inhibition were observed. The methanol extracts of *Coldenia procumbens* showed a maximum significant antibacterial activity against *Bacillus cereus, Escherichia coli, Pseudomonas aeromonas, Staphylococcus aureus* whereas the same work was moderate activity in acetone and aqueous extracts. Similarly, Shakila *et al.*[5]; Ramakrishnan *et al.*[6] and Been[7] *Coldenia procumbens* leaves extracts have excellent potential as antibacterial compounds against bacteria (*Bacillus cereus, Escherichia coli, Pseudomonas aeromonas, Staphylococcus aureus*) and they can be used in the treatment of infectious diseases. *Coldenia procumbens* showed maximum antibacterial activity and hence, this plant can be used to discover bioactive natural products that may serve as lead for the development of new pharmaceuticals.

In the present study, the four different concentrations and four solvents were used for the antimicrobial activity against some bacterial and fungal strains selected. The methanolic *C.procumbens* plant extract of 100µl concentration was more suitable for this investigation. The zone of inhibition in *E.coli* was 4, 4, 14 and 7 mm diameter in acetone, ethanol, methanol and water extract were used (Table 1). Khan *et al.*[8] found that the *B. ciliata* extract has potential inhibitory effects on all tested bacteria in both cold and hot water while the extracts of *J.officinale* and *S. album* showed limited inhibitory effects on few tested bacteria in both cold and hot water. The cold water extract of *B. ciliate* showed maximum activity against *B.subtilis* (19 mm), which is comparable with a zone of inhibition exhibited by ceftriaxone (20 mm) and erythromycin (19 mm).

In the current study showed the universal solvent of methanolic extract was better activity against fungi. *Aspergillus sydowi* was more sensitive in 12, 13, 14 and 15 mm diameter at 25, 50, 75 and 100µl concentration of methanolic extract followed by ethanol, acetone and water extract. In the same way, *A.raperi, A.terreus* and *Fusarium* sp. also detected the highest inhibition in methanolic extract of *C.procumbens* (Table 2). The present study concluded that the increase in concentrations enhance the zone of inhibition. This finding is in agreed with the report of Banso *et al.*[9], who observed that higher concentrations of antimicrobial substances showed higher inhibition. The antifungal substances contained in the extracts were fungistatic at lower concentrations, while becoming fungicidal at higher concentrations of the extracts of *Phyllanthus emblica*.

In earlier investigation, Wedelolactone, a coumastane compound was proven activity against *E. coli, B.subtilis, S. typhimurium, S. aureus S. epidermidis, Shigella flexneri* and *Pseudomonas*

aeruginosa[10,11,12]. Arul *et al.*[13] reported that the ethanolic extract of *C.procumbens* whole plant was found to inhibited five bacteria and one fungal strain. It showed maximum activity against *B. subtilis*, *E.coli*, *K. pneumoniae* followed by *S.typhimurium* and *P.aeruginosa*. The ethanolic extract also inhibited the growth of *Candida albicans.*

CONCLUSION

It can be concluded that whole plant extracts of *Coldenia procumbens* have great potential as antimicrobial compounds. So, they can be used in the treatment of infectious diseases and development of new pharmaceutical products.

Table 1: Studies on the antibacterial activity of *Coldenia procumbens* against clinical bacteria

S.No	Name of the Bacteria	Solvents	Zone ofinhibition(mm)			
			25µl	50 µl	75 µl	100 µl
1	*Bacillus cereus*	Acetone	1	2	5	7
		Ethanol	2	4	5	9
		Methanol	3	4	6	7
		Aqueous	2	3	4	6
2	*Escherichia coli*	Acetone	1	3	3	4
		Ethanol	2	3	3	4
		Methanol	7	8	10	14
		Aqueous	3	4	5	7
3	*Pseudomonas aeromonas*	Acetone	1	1	4	5
		Ethanol	2	6	3	3
		Methanol	2	7	6	9
		Aqueous	-	3	4	4
4	*Staphylococcus aureus*	Acetone	1	3	4	5
		Ethanol	3	6	3	4
		Methanol	5	6	7	7
		Aqueous	2	4	5	5

Table 2: Studies on the antifungal activity of *Coldenia procumbens* against clinical fungi

S.No	Name of the Fungi	Solvents	Zone of inhibition(mm)			
			25µl	50µl	75µl	100µl
1	*Aspergillus sydowii*	Acetone	4	6	12	13
		Ethanol	5	7	8	10
		Methanol	12	13	14	15
		Aqueous	4	6	7	8
2	*A.raperi*	Acetone	3	5	6	10
		Ethanol	3	6	9	16
		Methanol	9	12	14	17
		Aqueous	4	9	12	14
3	*A.terreus*	Acetone	-	-	-	-
		Ethanol	2	3	7	8
		Methanol	3	7	9	10
		Aqueous	2	2	3	5
4	*Fusarium*sp.	Acetone	4	7	8	10
		Ethanol	9	11	10	12
		Methanol	9	11	12	14
		Aqueous	8	9	10	11

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