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Phytochemical analysis and antimicrobial evaluation of *Evolvulus alsinoides* L.

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ABSTRACT

Use of plant based drugs and chemicals for curing various ailments and personal adornment is as old as human civilization. Plants and plant based medicines are the basis of many of the modern pharmaceuticals. The aim of the present study is finding out the bioactive chemical constituents and to evaluate the antimicrobial activity and heavy metal analysis of the methanol extract of *Evolvulus alsinoides*. L medicinal plant. This study involves the preliminary phytochemical screening separation and Identification of compounds. The results reveal that the presence of phenols, tannins, saponins, pseudo tannins, flavonoids, saponins, glycosides, steroids, steroidal glycosides, terpenoids, and alkaloids were detected in the selected plant tested. The extract also was tested for antimicrobial activity by disc method. The extract of the plant showed antimicrobial activity against both gram (+) and gram (-) bacteria.

Key words: *Evolvulus alsinoides*. L antimicrobial activity, phytochemical screening, pharmaceuticals.

INTRODUCTION

Medicinal plants have occupied a distinct place in human life right from the primitive period; they form the backbone of traditional medicine in the last few decades and have been the subjected of very intense pharmacological studies. They also represent valuable resources for a variety of chemicals or secondary metabolites of pharmaceutical importance. It has been estimated that out of about 2000 drugs that have been used in curing human ailments in India, only above 200 are of animal origin and a similar number are of mineral origin. The rest, i.e., about 1500 are of plant origin [1]. According to current estimates 74% of the pharmacologically active plant derived components were discovered after the ethno medical uses of the plants began to be investigated [2].

Plant kingdom is one of the most precious gifts to humanity by almighty. Right from the beginning human being was dependent upon plant for this food shelter and health maintenance since prehistoric times human being was struggling for the alleviation of diseases and individuals accumulated the knowledge about various plant derived drugs with the passage of time their efforts have led to the emergence of various disciplines of medicine like allopathic homeopathic, Ayurvedic and Chinese system etc [3].

MATERIALS AND METHODS

Collection of plant materials

Fresh plant parts of *Evolvulus alsinoides*. *L* was collected from Thottiam village, Tiruchirappalli District. The plant materials were identified by botanically. The plant materials were shaded and dried until all the water molecules evaporated and plants became well dried for grinding. After drying, the plant materials were grinded well using mechanical blender into fine powder and transferred into air tight container with proper labeling [4].

PREPARATION OF PLANT EXTRACTS

Solvent extraction

Crude plant extracts were extracted by Soxhlet extraction method [5]. About 200 gm of powdered plant materials were uniformly packed into a thimble and extracted with 750 ml of methanol as a solvent. The process of extraction continues for 24 hours till the solvent in siphon tube of an extractor become colorless. After that the extract was taken in a beaker and kept on hot plate and heated at 30-40 °C till all the solvent got evaporated. Dried extract was kept in refrigerator at 4 °C for phytochemical analysis.

PRELIMINARY PHYTOCHEMICAL SCREENING

Qualitative preliminary screenings of extracts were performed initially with different chemical reagents to detect the phytochemical constituents present in methanol and aqueous extracts. *Evolvulus alsinoides*. *L* was evaluated for preliminary phytochemical screening standard procedure. [6, 7].

ANTIMICROBIAL STUDIES

The antimicrobial activity was determined using disc diffusion method[5] by measuring zone of inhibition in mm and comparing with standard drugs *Ciproflaxin* (2µg/disc for bacteria) and *fluconozale* (10µg/disc for fungi)[12]. The plant was subjected to preliminary phytochemical screening for the detection of various plant constituents.

RESULTS AND DISCUSSION

PRELIMINARY PHYTOCHEMICAL SCREENING

Phytochemical screening of extracts Methanol *Evolvulus alsinoides*. *L* has been analyzed. Phytochemical analysis conducted on the plant extracts revealed the presence of constituents which are known to exhibit medicinal compounds as well as physiological activities. Analysis of the plant extracts revealed the presence of phytochemicals such as alkaloids, tannins, pseudo tannins, glycosides, steroidal glycosides, terpenoids, flavonoids and phenols [8]. They are shown in the table – 1.

ANALYSIS OF HEAVY METALS

The leaf extract was subjected to heavy metal analysis [13]. The metals are sodium, potassium, phosphorus, manganese, iron, calcium, zinc, lead, mercury, copper, nickel, and magnesium are found in the plant extracts. In the present study, potassium is found to be higher (113 ppm) in the *Evolvulus alsinoides*. *L* extracts [14]. Similarly sodium, phosphorus, manganese, iron, calcium, zinc, copper, nickel, magnesium have 2.05 ppm, 6.23 ppm, 0.010 ppm, 10.03 ppm, 19 ppm, 0.046 ppm, 0.035 ppm, 0.041 ppm, 2.01 ppm respectively. Lead and mercury is not detected in the extracts.(Table – 2.)

TOTAL PHENOLIC STRENGTH SCREENING

The total phenolic strength of the crude extracts of *Evolvulus alsinoides*. *L* is found to be 16.25% in the methanolic extract and 10.54% in the aqueous extract.

ANTIMICROBIAL STUDIES

Methonal extract of *Evolvulus alsinoides*. *L* plant shows antimicrobial activity against the tested organisms in the order of various concentrations. *Staphylococcus aureus*(18 mm), *Vibrio cholera*(22 mm), *Yersinia enterocolitica* (17 mm), *Salmonella typhi* (18 mm), *Bacillus subtilis*(13 mm), *Listeria monocytogenes*(15 mm), *Klebsiella pneumonia* (17 mm), *Bacillus megaterium*(16 mm) and fungi such as *Aspergillus niger* (17 mm), *Candida albicans*(21 mm) for 150 ml concentration. They are shown in the table – 4 [12].

Table 1: Preliminary phytochemical analysis of *Evolvulus alsinoides. L*

S. No	Name of the Test	Phytochemical constituents	Methanolic Extract	Aqueous Extract
1	Alkaloid	Mayer's test	+	-
		Dragendroff's test	+	+
		Wagner Test	-	-
2	Carbohydrate	Molish Test	+	-
		Fehling Test	-	-
		Benedicts Test	-	-
3	Steroidal Glycosides	Liebermann's test	-	-
		Salkowaski test	+	-
4	Saponin	Foam Test	-	-
5	Tannin	Lead Acetate	+	+
6	Pseudo tannins	Ferric chloride.	Condensed tannin	-
7	Chlorogenic acid	Ammonia test	+	-
8	Flavones	Shinoda's Test	-	-
9	Flavonoid	Ammonia test	++	-
10	Coumarin	Sodium chloride test	-	-
11	Anthocyanin	H ₂ SO ₄ test	-	-
12	Phenol	Folincoalteu test	++	+
13	Terpenoids	Salkowaski test	+	+

+ = present

++ = moderate

+++ = high

- = absent

Table 2: Heavy metal analysis of *Evolvulus alsinoides. L*

S. No	Name of the parameter	Values in Ppm
1	Sodium	2.05
2	Potassium	113
3	Phosphorus	6.23
4	Manganese	0.010
5	Iron	10.3
6	Calcium	19
7	Zinc	0.046
8	Copper	0.035
9	Nickel	0.0410
10	Lead	ND
11	Mercury	ND
12	Magnesium	2.01

ND = Not detected

Table 3 Total phenolic strength of *Evolvulus alsinoides. L*

S. No	Samples	Values in %
1	<i>Evolvulus alsinoides</i> Methanolic Extract	16.25
2	<i>Evolvulus alsinoides</i> Aqueous Extract	10.54

Table 4 Antimicrobial activity of *Evolvulus alsinoides. L*

S. No	Name of organisms	Inhibition values in mm			
		A	50 µl	100 µl	150 µl
1	<i>Staphylococcus aureus</i> (+)	30	12	15	18
2	<i>Vibrio cholerae</i> (-)	32	13	16	22
3	<i>Yersinia enterocolitica</i> (-)	30	13	15	17
4	<i>Salmonella typhi</i> (-)	32	14	17	18
5	<i>Bacillus subtilis</i> (+)	30	11	12	13
6	<i>Listeria monocytogenes</i> (+)	32	10	12	15
7	<i>Klebsiella pneumoniae</i> (-)	33	11	15	17
8	<i>Bacillus megaterium</i> (+)	30	10	13	16
9	<i>Aspergillus niger</i>	23	12	14	17
10	<i>Candida albicans</i>	26	12	15	21



Staphylococcus aureus
50 µl 100 µl 150 µl
12 mm 15 mm 18 mm



Vibrio cholerae
50 µl 100 µl 150 µl
13 mm 16 mm 22 mm



Yersinia enterocolitica
50 µl 100 µl 150 µl
13 mm 15 mm 17 mm



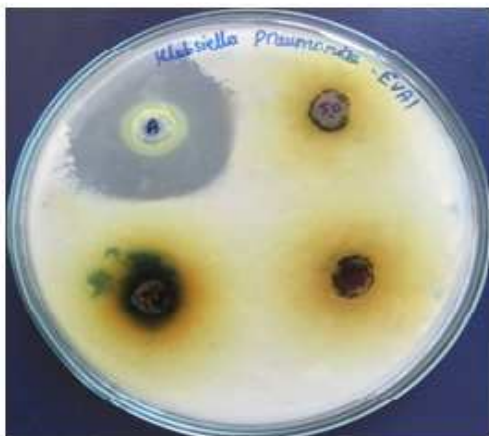
Salmonella typhi
50 µl 100 µl 150 µl
14 mm 17 mm 18 mm



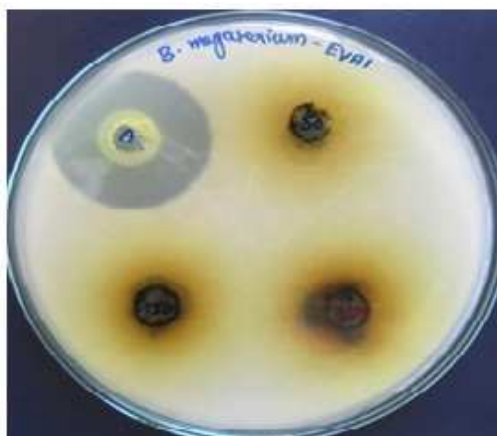
Bacillus subtilis
50 µl 100 µl 150 µl
11 mm 12 mm 13 mm



Listeria monocytogenes
50 µl 100 µl 150 µl
10 mm 12 mm 15 mm



Klebsiella pneumoniae
50 µl 100 µl 150 µl
11 mm 15 mm 17 mm



Bacillus megaterium
50 µl 100 µl 150 µl
10 mm 13 mm 16 mm



Aspergillus niger
50 µl 100 µl 150 µl
12 mm 14 mm 17 mm



Candida albicans
50 µl 100 µl 150 µl
12 mm 15 mm 21 mm

CONCLUSION

The present study reveals that the methanolic extract of plant leaves of *Evolvulus alsinoides. L* contains many bio active chemical compounds such as alkaloids, tannins, pseudo tannins, glycosides, steroidal glycosides, terpenoids, flavonoids and phenols and heavy metals such as sodium, phosphorus, manganese, iron, calcium, zinc, copper, nickel, magnesium. The same plant extract is effective against gram positive and gram negative bacteria as well as fungi. Therefore it can be concluded that antimicrobial activity of *Evolvulus alsinoides. L* against bacteria and fungi shows its medicinal value and supports the widespread use of the plant as local remedy for a variety of ailments. The presence of various bioactive compounds justifies the use of whole plant for various ailments by traditional practitioners.

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