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Review Article

A REVIEW ON PHARMACOGNOSY AND PHARMACOLOGY OF *EVOLVULUS ALSINOIDES* (L.) L.

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ABSTRACT

Plants are being used as therapeutic agents due to the side effects caused by synthetic drugs. Medicinal plants have been used from ancient time for the treatment and wellbeing of human beings. The metabolites of the plants are considered to be effective in treating many ailments. Various dosage forms and a wide array of extracts have been used in the traditional system of medicine with potent therapeutic activity experimentally and clinically. *Evolvulus alsinoides* (L). L is a perennial herb with anticonvulsant, nootropic, anti-inflammatory, antimicrobial, antioxidant, anxiolytic, cardioprotective effects and inhibition of lipid peroxidation in pancreas. This review article is a sincere effort to put forward the therapeutical importance and phytochemistry of the plant.

Key Words: *Evolvulus alsinoides*, Pharmacology, Pharmacognosy, Phytochemistry

INTRODUCTION

Medicinal plants have been used indigenously in the treatment of various disorders. The root, stem, leaves and flowers of the plant are used in various formulations. *Evolvulus alsinoides* (L.) L. is also been extensively used as traditional medicine in various culture. *E.alsinoides* is often prostrate, slender and wiry with long hairs. The plant is common in tropical and subtropical regions of the world[1]. The present article is an effort to present out the pharmacology, traditional uses and chemical constituents of the plant.

Taxonomy

Kingdom : Plantae
Division : Tracheophyta
Class : Magnoliopsida
Order : Solanales
Family : Convolvulaceae
Genus : *Evolvulus*
Species : *alsinoides* (L.) L.

Figure 1: Habitat of *Evolvulus alsinoides* (L). L

Pharmacognostical description of plant

E.alsinoides (L.) L, is a small, hairy, procumbent, diffuse perennial herb with a small woody branched rootstalk. The stem of the plant is wiry, slender, prostate, spreading clothed with long spreading hairs. The leaves are simple, alternate, oblong-ovate or elliptic-oblong, densely with appressed silky hairs. Flowers are light blue, solitary or of lanceolate, long peduncles, axillary, filiform pedicels, calyx is densely silky, calyx lobes, acuminate, 4 mm long, lanceolate, very acute. Corolla is 5mm long with 5 lobes. Androecium is epipetalous with filiform filaments, oblong with 5 Stamens. Gynoecium contains bi-carpellary tetra-locular ovary. Fruits are globose 4-valveddrooping capsule[2]. The major therapeutic agents obtained from the plant are Evolvine, Pentatriacontane, Triacotane, β-sitosterol, Glycoflavone, 4' methoxyvitexin, p-hydroxybenzoic, Vanillic, Protocatechuic and Gentistic acids and Quinines[3].

Traditional uses

The roots, stem and leaves are used in the treatment of various diseases. The plant has bitter, alexiteric, antihelminthic and febrifuge and is useful in the treatment of fever, loss of memory, syphilis, bronchitis, biliousness, epilepsy, leucoderma and promotes growth of hair, improves complexion and appetite[4,5,6&7]. The plant is also reported to be effective in learning enhancement and memory retention improvement at a dose of 0.5g/kg in mice when administered orally[8]. The plant is used in Ayurveda in the treatment of stress, neurodegenerative diseases, amnesia and asthma. Leaves are recommended for asthma and mental disturbances[9,10].

Phytoconstituents

Thirty compounds were identified through GC-MS analysis in methanolic extract of the whole plant. The active principles and

concentration (%) reported by Gomathi and Elango, 2015 are presented in (Table 1). The prevailing compounds were Squalene, 2-Hydroxy-3[(9e)-9-Octadecenoyl, Oleic acid, Octadecanoic acid, 1-(+)-Ascorbic acid 2,6dihexadecanoate and Caryophyllene[11].

Table 1: Components identified through methanolic extract in *Evolvulus alsinoides (Linn.) Linn* by GC-MS study[11]

Compound	Area%
Tricyclo[2.2.1.0(2,6)]heptane, 1,7,7-trimethyl	0.28
Alfa.-copaene	0.27
Cyclohexene,1-methyl-4- (1methylethenyl)-, (r)	0.32
Caryophyllene	4.37
1,6-cyclodecadiene, 1-methyl-5-m	0.47
(-)-5-oxatricyclo[8.2.0.0(4,6)]dodeca	1.00
1hcyclopropa[A]Naphthalene, 1a	0.32
Dotriacontane	0.46
Tetradecanoic acid	0.69
2,6,10-trimethyl,14-ethylene-14-pe	0.48
Pentadecanoic acid	0.36
3,7,11,15-tetramethyl-2-hexadecen-1-ol	0.37
Oleic acid $$ 9-octadecenoic acid (z)	1.04
Nonanedioic acid, dibutyl ester	0.74
L-(+)-Ascorbic acid 2,6 dihexadecanoate	17.32
Heptadecanoic acid	0.82
Behenic alcohol	0.42
Phytol isomer	1.78
Methyl stearate	0.48
Oleic acid	25.39
Octadecanoic acid	25.39
Cis-11,14-eicosadienoic acid, methyl ester	3.13
Nonadecanoic acid	0.67
Hexadecanoic acid, 2hydroxy-1,3	0.64
Octadec-9-enoic acid	0.75
Oleic acid $$ 9-octadecenoic acid (z)	0.95
Icosanoic acid	5.46
2-Hydroxy-3-[(9e)-9-Octadecenoyl	1.04
Squalene	2.05
Glycidol stearate	1.43

Pharmacological Properties

Anticonvulsant activity

A study carried out to determine the anticonvulsant activity and sedative hypnotic effect of the plant used crude methanolic extract at doses of 50, 100, 200 and 400 mg/kg Pentylenetetrazole induced seizure and maximal electroshock seizure models in mice and in Diazepam induced sleep model. A marked increase of 4-7 times in duration of sleep was observed compared to the control group. The dosage of 100-400 mg/kg increased the latency of Pentylenetetrazole induced seizure. 100% protection against seizure was observed at the highest dose of 400mg/kg. A dose dependent decrease in the duration of seizure was observed in the study. The anticonvulsant activity was found to be highest with 400mg/kg of the extract and 30mg/kg Diazepam[12]. These findings recommend the use of methanolic extract of the plant in the treatment of epilepsy.

Anti-inflammatory activity

The chloroform and ethyl acetate extracts have shown graded dose response at a dosage of 200 and 400 mg/kg body weight in acute toxicological studies. The anti-inflammatory activity of ethanolic extract showed a significant inhibition[13].

Antioxidant activity

A study on radical scavenging activity of the plant extract validates the significance of polar solvents to extract maximum antioxidants from the raw material. Aqueous extract has the maximum activity of 35.89-75.16% followed by ethanol (17.98-53.38%), ethyl acetate (14.85-45.70%), chloroform (8.91-.29.85%) and petroleum ether (5.11-28.87%)[14]. These findings indicate a significant radical scavenging activity sustaining its use in consistent medicinal practices.

Antimicrobial activity

E. alsinoides (L.) L, exhibited antimicrobial properties against *Acinetobacter baumannii*, *Aspergillus niger*, *Cryptococcus neoformans* and *Candida albicans* and mild activity against *Bacillus subtilis*, *Klebsiella pneumonia*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* when acetone extract was used, whereas methanolic extract is found to be highly effective[15,16]. The inhibitory effects of the extracts were comparable with that of the standard antibiotic used[17]. The MIC value of the ethanolic extract ranges from 16mg/ml (*Salmonella typhi)* to 512.5mg/ml (*Bacillus cereus* and *S. aureus*). The MIC ranged between 512.5mg/ml to >1025mg/ml for the aqueous extract. No inhibition of growth has been observed with the aqueous extract of *Salmonella typhi*, *Micrococcus luteus* and *S. aureus*[18]. Aqueous extract showed maximum inhibitory activity against *A. baumannii*, *E. coli*, *S. aureus* and *K. pneumonia*[14]. Inhibition of *Alternaria solani* spore germination has been reported with the alkaloid enriched fraction at 1000, 2500 and 5000 ppm[19]. An overall assessment of the antimicrobial qualities of "Dashapushpam" herbs shows that they are more effective as antifungal agents than as antibacterial agents.

Anxiolytic activity

Elevated plus maze test carried out with the ethyl acetate fractions of the plant extract have shown significant anxiolysis. Significant reduction in the rotarod performance was observed with a higher dose of 200 mg/kg. No such response was observed with the aqueous fraction. Neuromuscular coordination and potent antioxidant potential was observed with the ethanolic extracts[20].

Cardioprotective Effects

The attenuation of acute myocardial infarction in isoproterenol [ISP]-treated rat model maintaining cardiac function and activities of endogenous antioxidant enzymes was studied using the methanolic extract. Biochemical analysis in serum plasma and Heart tissue enzyme analysis was carried out in albino male rats. The results signifies cytoprotection with the plant extract at a dose of 100 & 200 mg/kg/p.o causes myocardial adaptation by supplementing endogenous antioxidants and protects the hearts from oxidative stress linked with ISP induced myocardial injury[21]. The results substantiate the potential therapeutic value in the treatment of ischemic heart diseases.

Effects in pancreas

Oral administration of plant extract for 45 days resulted in significant antioxidant activity with augmented insulin level and also repressed lipid peroxidation in pancreas of the streptozotocin induced diabetic rats. Administration of the plant extract to the study animals improves the antioxidant activity and remodels the structure of pancreas due to the presence of secondary metabolites with therapeutic potential in the ethanolic

extract of the plant[22]. These findings suggest that the use of plant extract effectively reduced the oxidative stress induced by streptozotocin and potentially increased the level of insulin). The inception of diabetes mellitus can be controlled with administration of the plant extract.

Nootropic activity

The alcoholic extracts of *E. alsinoides* (L.) L, have reported to possess superior nootropic activity with respect to the time spent in the enclosed arm and the mean avoidance response in plus maze model and on the jumping box model respectively[23]. The reports suggest the use of plant extract as cognitive enhancers to improve cerebral function.

Antileukaemic activity

The cytotoxic effects of the methanol extract and ether extract on the cell lines HL60, K562 and U937 reports the maximum antileukaemic activity of Kaempferol-3, 7-di-O-rhamnoside[24]. The report of cytotoxic effects using the plant extract suggests its use in the treatment of tumours.

CONCLUSION

Indian traditional literatures like Siddha and Ayurveda have mentioned herbal remediation for many human disorders. *Evolvulus alsinoides,* commonly known as 'Vishnukranthi' have various pharmacological activities such as anticonvulsant activity, anti-inflammatory activity, antioxidant activity, antimicrobial activity, anxiolytic activity, cardioprotective and pancreas protective, nootropic activity owing to its chemical constituents. The studies performed with the extracts evidenced for the therapeutic nature of the plant. More pharmacological investigation should be performed using cutting-edge techniques to discover the potential of the plant for the well-being of the mankind.

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