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***Evolvulus alsinoides* Linn. A PANACEA OF DIVERSE THERAPEUTIC  
POTENTIAL**

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**ABSTRACT**

**Introduction**

*Evolvulus alsinoides* (Sankhaholi/Shankpushpi) commonly known as slender dwarf morning glory plant) belongs to the family *Convolvulaceae*. It grows in open and grassy places throughout almost all over India and subtropical countries of the world. It has been traditionally used in Unani system of medicine to cure various ailments like nervous debility, insanity, epilepsy, asthma, cough, cardiac disorders, renal diseases, diabetes, syphilis, gonorrhoea, excessive emission, haemorrhoids, etc.

**Methods**

Several databases (PubMed, PubMed Central, Science Direct, and Google Scholar), were used to identify scientific works and publications using keywords such as *E. alsinoides* L., Sankhaholi, Botanical description, Pharmacological activities and traditional uses.

**Aim**

This review article aims to outline the existing evidence-based claims of traditional uses, newer pharmacological actions, and the therapeutic potential of *Evolvulus alsinoides*.

## Results and Conclusion

The current literature review and observations suggested that *Evolvulus alsinoides* is endowed with potent medicinal properties and also supports/justifies the traditional uses of the plant. However, further studies of herb and its phytochemicals are needed to isolate the unidentified active compound(s), newer indications & pharmacological action.

**Keywords:** *Evolvulus alsinoides*; Sankhaholi; Nootropic; Anxiolytic; Neuroprotective

## INTRODUCTION

*Evolvulus alsinoides* (Sankhaholi/Shankpushpi) is a Unani traditionally valued herb, employed clinically for its various promising medicinal properties. It belongs to the family *Convolvulaceae*, a heavy-growing herb with many spreading branches in many parts of South Asia and other tropical and sub-tropical areas [1]. Unani physicians used the herb in treating various ailments like nervous debility, insanity, anxiety neurosis, epilepsy, dysentery, asthma, cough, heart diseases, renal diseases, diabetes mellitus, syphilis, gonorrhoea, nocturnal emission, haemorrhoids, etc. . Moreover, recent studies claimed that plant is endowed with medicinal properties such as nootropic, antimicrobial, antidiabetic, anti-hypertensive, adaptogenic, immunomodulator, etc. Plants contain many bioactive chemical substances (alkaloids, tannin, flavonoids, phenolic compounds) that produce definite physiological and biochemical actions in the human body. *Evolvulus alsinoides* contains betaine, shankhapushpine, and evolvine,  $\beta$ -sitosterol, stearic, oleic, and linoleic acid, betaine,

pentatriacontane, and triacotane [2]. HPTLC fingerprinting analysis showed the presence of various alkaloids, flavonoids, and phenols (quercetin) in the ethanolic extract. It has been concluded that the antibacterial properties of essential or volatile oils can be due to their hydrocarbon and terpenes constituents [3]. Methanolic extract of the herb is reported to possess phenolic compounds and flavonoids which exhibit Lipid peroxidation, antioxidant, and free radical scavenging properties [4]. The antioxidant activity of this plant can be attributed to the presence of antioxidant phytochemicals like polyphenolic, steroids, and triterpenes and its use in the prevention of various diseases such as diabetes, cardiovascular disease, and cancer [5]. The anti-convulsant activity can be due to their saponin and flavonoid compounds [6]. The presence of secondary metabolites in the methanolic extract can be attributed to the chemopreventive, anticancer, antimicrobial, antioxidant, and antiinflammatory activities of the plant [7]. Several pre-clinical and clinical studies have been conducted to detect phytochemicals and active metabolites of the plant.

The current review is an attempt to summarize the existing evidence-based claims, of traditional uses, newer pharmacological actions, and therapeutic potential of *Evolvulus alsinoides* in various ailments of the body.

### Vernacular Names [8], [9]

Scientific Name: *Evolvulus alsinoides* (L.)

English: Slender dwarf morning glory

Gujarati: Kalisankhavali

Hindi : Shyamkranti, sankhpushpi

Malyalam: Vishnukranti

Marathi : Vishnukanta

Kannad: Shankvel [5]

Punjabi: Kodyali, Sankpushpi

Sanskrit: Vishnukranti, Vishnugandhi

Tamil: Vishnukarandi, vishukaranti

Telugu: Vishnukranta, kancakura

Bombay: Sankhavali

Unani: Sankhaholi

Urdu: Sankhaholi



### Botanical Description

*Evolvulus alsinoides* (Sankhaholi/Shankpushpi) commonly known as slender dwarf morning glory plant) belongs to the family *Convolvulaceae*. *Evolvulus alsinoides* a common weed, extensively spread almost throughout India, ascending upto 1500 meters in the Himalayas. The plant prefers shady and humid climatic conditions. It grows in open and grassy places and has a pan-tropical distribution encircling tropical and warm-temperate regions of Australia,

Asia, Indomalaya, Polynesia, Sub-Saharan Africa, and America [9]. It is commonly found in India, Africa, and the Philippines [5]. It is prostrate, prominently branched, more than 30 cm long, numerous, slender, wiry, and clothed with long hairs and remarkably variable annual or perennial herb. The leaf is minute and with dense silky hair. Leaves are ample, subsessile or shortly petioled, blade elliptic to linear-oblong, 8–26 mm long, 2–10 mm wide, acute or curved at both ends, silky pilose on both surfaces;

petiole is short about 3 mm long. The inflorescence has a lean peduncle with 1–5 flowers blue or light blue, 6–40 mm long with narrow bracts of about 5 mm. long and 0.75 mm wide. Pedicels are 2–10 mm long. Sepals are ovate-lanceolate with up to 5 mm length and 1 mm width [8], [9]. Fruit is globose with four valved capsules containing dark brown to black smooth seeds [10]. Seeds are usually 4 in number, ovoid in shape with pale brown to black. Bracts are persistent and linear. Pollination is through insects and seeds are dispersed by winds [9].

#### ***Evolvulus alsinoides* in Unani Medicine**

In Unani medicine *Evolvulus alsinoides* (Sankhaholi) is described as a climber, having thin branches. Its leaves are lying on the ground. It has numerous small-sized white flowers and an astringent taste. The temperament (*Mizaj*) of the plant is mentioned as *Cold and wet*. Its medicinal properties are mentioned in classical literature as a brain tonic, laxative, antitussive, anticonvulsant, anti-emetic, aphrodisiac, appetizer, astringent, blood purifier, diuretic, cardiac tonic, digestive, diuretic, exhilarant, eye tonic, febrifuge, hair tonic [9], [11]. It is indicated in heart disorders, nervous system disorders, diabetes, diseases of kidneys and bladder, eye diseases, piles, night emission, scrofula, asthma, etc. The bark of its root is used to enhance libido and increase the viscosity of

semen. Seven grams of the bark of the plant along with 1.75 grams of *Tukhm Sambhalu* (*Vitex negundo* seeds) is taken to treat flatulence, diabetes, and burning micturition in gonorrhoea and eye diseases. It is beneficial in the treatment of piles if taken along with *Kali mirch* (*Piper nigrum*). The decoction of the plant is useful in the treatment of gonorrhoea and fever (in children). The leaves are made into cigarettes and smoked for cough and bronchial asthma. Its root is put onto an enlarged gland in the neck [9], [11].

#### **Phytochemical and Elemental Constituents**

The preliminary phytochemical screening carried out by Omogbai and Eze showed that *E. alsinoides* contains some secondary metabolites such as glycosides, alkaloids, polyphenols, carbohydrates, amino acids and proteins, saponins, volatile oil, flavonoids, tannins [7], [12]. The results of this research highlighted the fact that ethanol extracted the most phytochemical constituents [3]. GCMS analysis of a methanolic extract of *Evolvulus alsinoides* Linn revealed the presence of thirty compounds. The prevailing compounds were Squalene, 2-Hydroxy-3-[(9e)-9-Octadecenoyl, Oleic acid, Octadecanoic acid, 1-(+)-Ascorbic acid, 2,6-dihexadecanoate and Caryophyllene [7].

Vitamin analysis of *Evolvulus alsinoides* showed the presence of Vitamin E, C, and

D. The inorganic elements such as calcium, sodium, potassium sulfate, phosphate, chloride, Nitrate, magnesium, and iron were present while carbonate was absent. The results of this study suggested that the herb may be a good source of phytochemicals, vitamins, and minerals [13].

*E. alsinoides* L. (whole plant) contains alkaloids such as shankhapushpine, evolvine, betaine, stearic, triacontane, beta-sitosterol, and pentatriacontane. The fresh plant contains volatile oil. Essential oils such as cis-a-necrodol, g-nonalactone, hexane-1-ol, and g-butyrolactone are present in aerial parts of the plant. Studies have suggested two new glycosidic acids (Evolvulic acids C and B), isolated from crude resin glycoside fraction of the whole plant. Compounds such as ethyl ester, n-hexadecanoic acid, octadecanoic acid, dibutyl ester levoglucosenone, cytidine, beta-D-glucopyranoside, oleic acid, dotriacontane, methyl, D-allose, etradecanoic acid, diethyl phthalate, pentadecanoic acid, nonanedioic acid, heptadecanoic acid were reported from methanolic extract of whole plant and leaves of the plant [14]. The phytochemicals present in the ethanolic extract of *E. alsinoides* L. (whole plant) are Ethyl oleate, neophytadiene, piperine, hexadecanoic acid, docosanol, 4-(3-Hydroxybutyl) phenol, cholesterol, 6-methoxy-7O-b-glucopyranoside coumarin, eicosamethyl

stigmast-5-en-3-ol, kaempferol-7-O-b-glucopyranoside, fucoxanthin, phytol, quercetine-3-O-b-glucopyranoside, caffeic acid, etc. [2], [8]

### Pharmacological Activities

#### Nootropic Activity

The study of ethanol extract of *Evolvulus alsinoides* and its ethyl acetate and aqueous fractions for memory-enhancing properties with doses of 100 and 200 mg/kg p.o reveals that both doses of all the extracts of EA significantly improved learning and memory in rats and was compared using piracetam as the standard [15]. EA is traditionally used for memory enhancement. Its scavenging properties in the brain could be suggested as a reason for the protective effect of ethanolic extract of EA against scopolamine-induced degradation of Ach [16]. Moreover, AChE inhibitory activity was reported due to the compound Kaempferol 3, 7- diglucoside of *E. alsinoides* and compound protects differentiating neuronal cells, SH-SY5Y from Amyloid  $\beta$  Peptide-induced Injury and hence could be proposed as a natural bioactive in the management of Alzheimer's disease [17].

#### Antioxidant Activity

Several studies reported the antioxidant properties of EA. It acts by inhibiting free radical scavenging activity. Thus, it can be used as a chemo preventive agent and

beneficial in slowing oxidative stress-related degenerative diseases. The antioxidant activity of the EA extract was studied and the extract was found to have higher activity when compared with the standard anti-oxidant (Ascorbic acid) [18].

#### **Antimicrobial Activity**

Many infectious diseases have been treated with several herbal drugs since ancient times. The flavonoid and alkaloids present in *E. alsinoides* may be responsible for the antimicrobial activity [19]. G.K. et al evaluated the anti-helminthic activity of the ethanolic extract of EA on an adult Indian earthworm, *Pheretima posthuma*, and was compared with *Piperazine citrate*. The extract caused paralysis followed by the death of the worms at all tested dose levels and was more potent than the control. The results of antimicrobial activity which was performed by the Agar cup plate method revealed that the extract exhibited activity against *Pseudomonas aeruginosa* and *Escherichia coli* but was inactive against *Staphylococcus aureus* and *Candida albicans*. However, none of the test concentrations exhibited comparable activity with the reference control ampicillin trihydrate for anti-bacterial activity [20].

The extract of *E. alsinoides* showed antibacterial activities and was found to be more pronounced on the gram-positive bacteria *S. aureus* than the gram-negative bacteria *E. coli*. It was assessed by

measuring the inhibition zone, varying diameter from 10 to 17 mm. The study revealed that the extracts are potent against all the tested microorganisms, *S. aureus*, *B. cereus*, *E. coli*, and *P. aeruginosa*. In the root extract, the maximum inhibition zone diameter was obtained in *S. aureus* and *B. cereus* with a diameter of 17 mm and 14 mm, respectively. The results of this work suggest that the plant has a broad spectrum of antimicrobial activity and can be used as an alternative to antibiotics [21]. The antimalarial effect of standardized methanolic extract of *E. alsinoides* was also reported [22].

#### **Antiinflammatory Activity**

L. Ganju et al. reported significant anti-inflammatory activity of *Amla* and *Shankpushpi* in Adjuvant Induced Arthritis (AIA) animals. There was noted significant reduction ( $p < 0.01$ ) in swelling and redness of inflamed areas in treated animals than in untreated controls. The study also reveals the ability of extracts to suppress lymphocyte proliferation in response to AIA. Both are as good as dexamethasone, a traditionally used immunosuppressant for arthritis. The inhibitory activity of *Amla* and *Shankpushpi* might have been due to their anti-inflammatory properties and ability to counteract NO-induced oxidative damage, which eventually helps in the remodeling of cells [23].

The anti-inflammatory effect of the crude extract of EA at a 500 mg/kg dose in the second hour after carrageenan injection strongly suggests its NSAID-like activity. The effect was compared with the standard drug indomethacin which produced a significant anti-oedematous effect, which was following previous reports indicating that NSAIDs show marked inhibition of carrageenan-induced oedema in rats [24].

The inflammatory activity in the form of heat haemolysis was significantly reduced at 50 and 100 µg/ml while hypotonic solution-induced inhibition was shown significant at 50, 100, and 200 µg/ml. However, the EA showed more significant results at 200 mg/kg in comparison to other doses. Studies revealed that extract has antiinflammatory activity which is very important for the treatment of neurodegenerative diseases. It can be concluded from the study that EA possesses highly significant anti-inflammatory activity in a dose of 200 mg/kg so that it can be used as therapeutics against inflammation in several CNS diseases [16].

The EA extract showed effective anti-inflammatory activities in the prostate and the histological studies showed a considerable improvement in the prostatic histo-architecture. The findings suggest that EA has a beneficial effect on the prevention and treatment of non-bacterial prostatitis. The extract of EA decreased the expression

of pro-inflammatory cytokines in a non-bacterial prostatitis rat model. Moreover, reduced TNF- $\alpha$ , IL-6, and IL-8 concentrations in the prostate tissue of prostatitis rats (nonbacterial) were reported [25].

#### ***Antidiarrhoeal Activity***

The ethanolic extract of EA showed significant anti-diarrhoeal activity ( $P < 0.001$ ) at a dose of 500 mg/kg body weight when compared with the control group. The extract of *E. alsinoides* showed dose-dependent effects in controlling the diarrhoea. The results were similar to those of the standard drug diphenoxylate concerning the severity of diarrhoea [24].

#### ***Antipyretic Activity***

The ethanolic extract of the plant was evaluated for antipyretic activity and found to be very effective as paracetamol in reducing hyperthermia ( $P < 0.05$ ) within 2 hours of administration. Brewer's yeast-induced pyrexia was used as a screening tool for antipyretic agents in rodents. *E. alsinoides* extract produced significant antipyretic activity at a dose of 500 mg/kg [24].

#### ***Anxiolytic***

In the elevated plus maze, ethyl acetate fractions of EA at 100 mg/kg per oral showed an anxiolytic effect as evidenced by an increase in the time spent in open arms and the number of open arm entries, compared to the control group. The open-

field exploratory behavior was also increased on the administration of the ethyl acetate fractions (100 mg/kg p.o.) of both drugs [26].

P. Gupta *et al.* reported Evolvoids A showed significant anti-stress activity by normalizing hyperglycemia, corticosterone level, creatine kinase, and adrenal hypertrophy. Evolvoids B also showed anti-stress activity but no effect on adrenal hypertrophy [27]. Evolvosides C, D, and E also revealed their anti-stress activity [28].

#### ***Antihypertensive Activity***

Anti-hypertensive mechanism of *Evolvulus alsinoides* was evaluated by using a DOCA salt-induced hypertensive model and was compared with enalapril which is an ACE enzyme inhibitor. In this study, hypertension was induced by 25 mg/kg s.c. DOCA (Deoxycorticosterone acetate) injection into nephrectomized rats. The methanolic extract of herb possessed profound antihypertensive activity due to the ACE inhibitor mechanism [9], [29].

#### ***Antitumor Activity***

Methanolic extract of *E. alsinoides* plant has induced expression of tumor suppressor p53 gene in MCF7 cancer cells and suppressed the expression of BCl2 gene, hence the therapeutic potential of methanolic extract of *E.alsinoides* plant for anti-cancer activities in vitro, proven to be effective to treat cancer progression [30].

Tumor regression studies showed a regression response for tumor growth in vivo of murine mouse melanoma. The treatment produced a delay in tumor growth, as demonstrated by increasing the VDT (Volume doubling time) and GD (growth delay). Indications are available that this plant has got antioxidant properties. Prevention of oxidative damage can be employed as one of the ways in tumor regression by supplementation of antioxidants and phyosterols-rich food [31].

#### ***Antihyperlipidaemic Activity***

Stigmast-5-en-3 $\beta$ -ol (beta-sitosterol) obtained from chloroform fraction of *E. alsinoides* showed a marked anti-hyperlipidaemic potential by reducing the total cholesterol, triglycerides, low-density lipoproteins level, and significantly increased high-density lipoprotein level [31]. Oral administration of ethanolic extract *E. alsinoides* (150 mg/kg body weight per day) to streptozotocin-induced diabetic rats for 45 days significantly reduced the levels of triglycerides, phospholipids, cholesterol, and free fatty acids in serum and tissues, it increases the high-density lipoprotein in serum as that of control. The ethanolic extract of *E. alsinoides* supplementation is quite beneficial in controlling lipid levels during diabetes mellitus and also reduces the cardiovascular risk factors associated with diabetes (Gomathi *et al.*, 2013).

### **Wound Healing Activity**

Several natural products chiefly comprising of active principles like triterpenes, alkaloids, flavonoids, and biomolecules reported to promote the process of wound healing. The dermal wound healing potential of acidic and basic alkaloid fractions of *E. alsinoides* (1% and 2%) was evaluated on albino rats following excision and incision wound models and compared with single alkaloid betaine ointment (0.5% and 1%). The drug was applied topically for 14 consecutive days at a dose of 50 mg/animal/day. On the 15th, post-wounding day, the granulation tissues were carefully removed and preserved for further studies. Soframycin (framycetin sulfate 1%) ointment was chosen as a positive control for the study. The topical application of betaine (0.5% and 1%), AAO, and BAO (1% and 2%) were found to possess potential wound healing properties. They improved the different phases of wound repair, including protein synthesis, wound contraction, cellular infiltration, neo-vascularization, and epithelisation [22].

In another study, a full-thickness skin wound was produced on the fur of the dorsum (below the rib cage). Each wounded animal was housed in a separate sterile polypropylene cage and animals were treated with leaf and flower extract paste. Sterile gauze was re-applied every alternative day. The wound size was

calculated and the granulation tissue was removed every fourth day. A significant reduction in wound size and an increase in the skin tensile strength of the extract-treated group were noted. There was a substantial increase in fibroblast and collagen density in the extract-treated group [33].

### **Anticonvulsant Activity**

The anticonvulsant activity of the crude methanolic extract was investigated at doses of 50, 100, 200, and 400 mg/kg using the Pentylentetrazole (PTZ) induced seizure (chemically induced seizure) and maximal electroshock seizure (electrically induced seizure) models in mice. The sedative-hypnotic effect was also studied using the Diazepam induce sleep model. *Evolvulus alsinoides* extract produced 50-100% protection of the mice against PTZ-induced seizure at doses of 100-400mg/kg. The protection of the extract against PTZ-induced convulsion demonstrated that the extract interacts with GABA-ergic neurotransmission [6].

### **Neuroprotective Activity**

*Evolvulus alsinoides* is a perennial herb used as a neuroprotective drug in traditional systems of medicine [12]. In neuro-degeneration, oxidative stress plays an important role in the aging process, and the brain is highly susceptible to oxidative imbalance. Yadav *et al.* suggested that treatment with ethanolic extract of the herb

significantly reduced the AChE activity, attributed to enhanced neuroprotective effect (Yadav *et al.*, 2019).

Jayasuriya W. J. A. B. N. *et al* concluded that the aqueous and ethanolic extracts of *E. alsinoides* exert significant antacid activity demonstrated by the acid-neutralizing effect and neutralizing capacity assays. Effervescent granules were formulated using *E. alsinoides* aqueous extract and it result in a significant in vitro antacid effect (Jayasuriya *et al.*, 2022).

### CONCLUSION

Researches have suggested that *Evolvulus alsinoides* is endowed with potent medicinal properties and also supports/justifies the traditional uses of the plant. However, further studies of herb and its phytochemicals are needed to isolate the unidentified active compound(s), newer indications & pharmacological action.

### Funding

None

### Conflict of Interest

The authors declare no conflict of interest.

### REFERENCES

- [1] H. Z. Mahmood, "Clinical Microbiology: Open Access Assessment of Phytochemicals and Antibacterial Activity of *Evolvulus alsinoides*," vol. 10, no. 345, pp. 1–4, 2021.
- [2] B. Kathirvel, S. Kalibulla, V. Shanmugam, and V. Arumugam, "A review on the pharmacological properties of *Evolvulus alsinoides* (Linn)," *Journal of Indian System of Medicine*, vol. 9, no. 3, p. 153, 2021, doi: 10.4103/jism.jism\_8\_21.
- [3] D. Gomathi, M. Kalaiselvi, G. Ravikumar, D. Sophia, V. Kanniappan Gopalakrishnan, and C. Uma, "Secondary metabolite credentials of *Evolvulus alsinoides* by high performance thin layer chromatography (HPTLC)," *J Biomed Res*, vol. 26, no. 4, pp. 295–302, 2012, doi: 10.7555/JBR.26.20110128.
- [4] A. Sudhakumari, "Cardioprotective Effects in Methanolic Extract of *Evolvulus alsinoides* Linn on Isoproterenol - Induced Myocardial Infarction in Albino Rats," *International Journal of Basic Medical Sciences and Pharmacy (IJBMS)*, vol. 2, no. 2, pp. 52–57, 2012.
- [5] M. Kumar Yadav, S. K. Singh, J. S. Tripathi, and Y. B. Tripathi, "Ethnopharmacological Activities of Traditional Medicinal Plant: *Evolvulus alsinoides*," *World J Pharm Pharm Sci*, vol. 5, no. 4, pp. 2263–2268, 2016, doi: 10.20959/wjpps20164-6562.
- [6] K. Abubakar, R. Abdulkadir, N. Ear, and C. Centre, "Evaluation of the

- Anticonvulsant Effect of the Methanol Extract of *Evolvulus alsinoides* in Mice,” vol. 2, no. 6, pp. 436–441, 2013.
- [7] G. L. Rajashyamala, “Identification of bioactive components and its biological activities of *Evolvulus alsinoides* linn. -A GC-MS study,” ~ 41 ~ *International Journal of Chemical Studies*, vol. 3, no. 1, pp. 41–44, 2015.
- [8] A. Singh, “Review of Ethnomedicinal Uses and Pharmacology of *Evolvulus alsinoides* Linn.,” *Ethnobot. leafl.*, vol. 12, pp. 734–774, 2008.
- [9] M. B. Siraj, A. A. Khan, and U. Jahangir, “Therapeutic Potential of *Evolvulus alsinoides* ,” *Journal of Drug Delivery and Therapeutics*, vol. 9, no. 4-s, pp. 696–701, 2019, doi: 10.22270/jddt.v9i4-s.3302.
- [10] C. P. Khare, “*Evolvulus alsinoides* Linn.,” *Indian Medicinal Plants*, pp. 1–1, 2007, doi: 10.1007/978-0-387-70638-2\_609.
- [11] Najmul Ghani, *Khazainul Adviya*. Idara Kitabushshif, Delhi, India, 1917.
- [12] D. Gomathi, G. Ravikumar, M. Kalaiselvi, B. Vidya, and C. Uma, “HPTLC fingerprinting analysis of *Evolvulus alsinoides* (L.) L.,” *J Acute Med*, vol. 2, no. 3, pp. 77–82, 2012, doi: 10.1016/j.jacme.2012.08.004.
- [13] T. K. Sujayi and T. S. Dhanaraj, “Phytochemicals and Elemental Analysis of *Evolvulus alsinoides* Leaf Extract,” *Int J Sci Res*, vol. 5, no. 9, 2016.
- [14] T. K. Sujayil and T. S. Dhanaraj, “Determination of bioactive compounds in *Evolvulus alsinoides* leaf extract using GC-MS technique,” *Res. j. life sci. bioinform. pharm. chem. sci.*, vol. 2, no. 3, pp. 31–34, 2016.
- [15] M. H. Jang, X. L. Piao, J. M. Kim, S. W. Kwon, and J. H. Park, “Inhibition of cholinesterase and amyloid- $\beta$  aggregation by resveratrol oligomers from *Vitis amurensis*,” *Phytotherapy Research*, vol. 22, no. 4, pp. 544–549, 2008, doi: 10.1002/ptr.
- [16] U. K Patil and G. Jain, “Assessment of Acetylcholinesterase Inhibition and Anti-inflammatory Activity of Ethanolic Extract of *Evolvulus alsinoides* Linn.,” *Int J Pharm Investig*, vol. 11, no. 1, pp. 104–107, 2021, doi: 10.5530/ijpi.2021.1.19.
- [17] K. KP. Pavithra MKS, “Extraction, Isolation and Identification of Kaempferol 3,7 – Diglucoside in the Leaf Extracts of *Evolvulus alsinoides* (Linn.) and its Inhibition Potency against  $\alpha$ -Amylase,  $\alpha$ -Glucosidase,

- Acetylcholinesterase and Amyloid Aggregation,” *Pharmacogn Mag*, vol. 16, no. 69, pp. 227–234, 2020, doi: 10.4103/pm.pm\_583\_19.
- [18] D. Gomathi, G. Ravikumar, M. Kalaiselvi, B. Vidya, and C. Uma, “In vitro free radical scavenging activity of ethanolic extract of the whole plant of *Evolvulus alsinoides* (L.) L.,” *Chin J Integr Med*, vol. 21, no. 6, pp. 453–458, 2015, doi: 10.1007/s11655-014-1763-0.
- [19] B. Gollen and J. Mehla, “*Evolvulus alsinoides*: An Emerging Antibacterial Medicinal Herb,” vol. 3, no. 1, pp. 1–2, 2018.
- [20] G. K. Dash, P. Suresh, S. K. Sahu, D. M. Kar, S. Ganapaty, and S. B. Panda, “Evaluation of *Evolvulus alsinoides* Linn. for anthelmintic and antimicrobial activities,” *Journal of Natural Remedies*, vol. 2, no. 2, pp. 182–185, 2002.
- [21] B. Saranya, D. Sarathadevi, and S. S. N. Somasundaram, “Investigation of Antibacterial Activities of *Evolvulus alsinoides* (L.) against Clinical Pathogens,” *Int J Curr Microbiol Appl Sci*, vol. 4, no. 5, pp. 491–497, 2015.
- [22] S. Mahibalan, M. Stephen, and R. T. Nethran, “Dermal wound healing potency of single alkaloid (betaine) versus standardized crude alkaloid enriched-ointment of *Evolvulus alsinoides*,” vol. 0209, 2016, doi: 10.1080/13880209.2016.1185636.
- [23] L. Ganju, D. Karan, S. Chanda, K. K. Srivastava, R. C. Sawhney, and W. Selvamurthy, “Immunomodulatory effects of agents of plant origin,” *Biomedicine and Pharmacotherapy*, vol. 57, no. 7, pp. 296–300, 2003, doi: 10.1016/S0753-3322(03)00095-7.
- [24] U. M. D. Lekshmi and P. N. Reddy, “Preliminary studies on antiinflammatory, antipyretic, and antidiarrhoeal properties of *Evolvulus alsinoides*,” *Turkish Journal of Biology*, vol. 35, no. 5, pp. 611–618, 2011, doi: 10.3906/biy-0904-19.
- [25] G. L. Rajashyamala and Elango V, “Effects of *Evolvulus alsinoides* Linn. in inflammatory markers in prostatitis induced rat model,” *World Journal of Science and Research*, vol. 1, no. 2, pp. 114–119, 2015.
- [26] A. Nahata, U. K. Patil, and V. K. Dixit, “Anxiolytic activity of *Evolvulus alsinoides* and *Convolvulus pluricaulis* in rodents,” *Pharm Biol*, vol. 47, no. 5, pp. 444–451, 2009, doi: 10.1080/13880200902822596.
- [27] P. Gupta et al., “Anti-stress constituents of *Evolvulus alsinoides*: An ayurvedic crude drug,” *Chem Pharm Bull (Tokyo)*, vol. 55, no. 5,

- pp. 771–775, 2007, doi: 10.1248/cpb.55.771.
- [28] P. Gupta, U. Sharma, P. Gupta, K. B. Siripurapu, and R. Maurya, “Evolvosides C-E, flavonol-4-O-triglycosides from *Evolvulus alsinoides* and their anti-stress activity,” *Bioorg Med Chem*, vol. 21, no. 5, pp. 1116–1122, 2013, doi: 10.1016/j.bmc.2012.12.040.
- [29] U. H. Joshi, K. R. Dabhi, T. R. Desai, and P. R. Tirgar, “Investigation of antihypertensive mechanism of *Evolvulus alsinoides* in DOCA salt induced hypertensive rats,” *Journal of Pharmacy Research*, vol. 5, no. 7, pp. 3613–3617, 2012.
- [30] A. K. H. V. & Muralidhar. S. T. Nazanin Soubakhsh Moghadam, “Therapeutic Potential of Methanolic Extract of *Evolvulus alsinoides* Plant for Anti-Cancer Activities in Vitro,” *International Journal of Applied and Natural Sciences (IJANS)*, vol. 6, no. 3, pp. 1–8, 2017.
- [31] D. Iyer and U. K. Patil, “Efficacy of  $\beta$ -sitosterol isolated from *Evolvulus alsinoides* L. as anti-hyperlipidemic and anti-tumor agent: Evidence from animal studies,” *Chin J Integr Med*, no. 462044, pp. 1–7, 2014, doi: 10.1007/s11655-014-1841-3.
- [32] D. Gomathi, G. Ravikumar, M. Kalaiselvi, K. Devaki, and C. Uma, “Effect of *Evolvulus alsinoides* on lipid metabolism of streptozotocin induced diabetic rats,” *Asian Pac J Trop Dis*, vol. 3, no. 3, pp. 184–188, 2013, doi: 10.1016/S2222-1808(13)60037-7.
- [33] U. M. Dhanalekshmi, G. Poovi, N. Kishore, M. D. Raja, and P. N. Reddy, “Evaluation of wound healing potential and antimicrobial activity,” vol. 1, no. 2, pp. 49–61, 2010.
- [34] M. K. Yadav *et al.*, “Neuroprotective activity of *Evolvulus alsinoides* & centella asiatica ethanolic extracts in scopolamine-induced amnesia in swiss albino mice,” *Open Access Maced J Med Sci*, vol. 7, no. 7, pp. 1059–1066, 2019, doi: 10.3889/oamjms.2019.247.
- [35] W. J. A. B. N. Jayasuriya, H. U. V. Hettiarachchi, T. D. M. T. S. Kumara, and N. T. B. Dias, “Formulation and evaluation of in vitro antacid effect of effervescent granules containing extracts of *Evolvulus alsinoides*,” vol. 12, no. 1, pp. 9–19, 2022.