Review Article

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Phytochemical composition and therapeutic effects of amaranthus viridis linn: a review

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Abstract

The plant *Amaranths viridis Linn*, an annual herb from the Amaranthaceae family, is used in traditional medicine to cure a range of ailments and to determine the various criteria for pharmacognostical standards. *A. vilidis L.* leaf extract contains a number of biologically active substances, including saponins, tannins and phenols, flavonoids, alkaloids, cardiac glycosides, steroids, and triterpenoids. The amino acids lysine, arginine, histidine, cysteine, phenylalanine, leucine, isoleucine, valine, threonine, methionine, and tyrosine are among the substances found in *A. viridis*. *A. vilidis L* contains a chemical compound with potent anti-inflammatory, antihepatotoxic, antiulcer, antiallergic, and antiviral effects. They also exhibit antimicrobial, antipyretic, antihyperlipidemic,antidiabetic, and anti-HMG-CoA reductase activities.

Keywords*: Amaranths viridis Linn,* triterpenoids, antihyperlipidemic, antimicrobial,anti-inflammatory,antiallergic.

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Introduction

One significant natural resource that a nation has is medicinal plants. They are crucial in helping the rural people receive primary healthcare services. In addition to acting as therapeutic agents, they are crucial raw materials used in the production of conventional pharmaceuticals [1]. Even today, herbal medicine continues to be a significant component of the healthcare system. In comparison to chemical systems of treatment like the allopathic system, products with a herbal origin appear to have less adverse effects [2]. The annual herb slender amaranth (*Amaranthus viridis L.*) is a member of the Amaranthaceae family. It has been utilized for countless years and has established itself as a fundamental component of numerous cooking customs and methods. Nearly 60 species of the genus *Amaranthus* are indigenous to tropical and subtropical areas of Asia, North America, Europe, and Australia. *Amaranthus albus* (white pigweed), *Amaranthus arenicola* (sand hill amaranth), *Amaranthus australis* (southern amaranth), *Amaranthus bigelovii* (Bigelow's amaranth), *Amaranthus viridis L.* (Slender amaranth), etc. are only a few of the many variations and cultivars that belong to the genus *Amaranthus*. The most common of these is *Amaranthus viridis L* [3].

Amaranthus viridis L (Amaranthaceae) (A. viridis), also known as "Chilaka Thota-Kura" in Telugu, has been utilized in Indian traditional medicine. *A. viridis* contains the amino acids lysine, arginine, histidine, cystine, phenylalanine, leucine, isoleucine, valine, threonine, methionine, tyrosine, and tryptophan. Traditional uses include treating asthma, respiratory issues, venereal illnesses, and urinary tract inflammation. The plant also has ribosome inactivating protein, beta-carotene, and antiviral characteristics in addition to antiproliferative and antifungal lactin

properties. Additionally, the whole plant has analgesic and antipyretic effects and is utilised in traditional medical systems to treat pain and fever, respectively [4].

Morphology

A 30–60 cm tall, erect, branching, annual plant with purple-colored branches. Long-petioled, variable-width, ovate leaves measure 2.5–5 cm. Flowers are tiny, pale green spike-like structures that grow in axillary clusters, racemes, and terminal paniculate spikes.

Local name: Shaknotey.

Habit: Herb.

Habitat: Roadsides, waste lands.

Phenology: Throughout the year.

Chromosome number: 2n=34

Status of occurrence: Common.

Medicinal Uses

The plant is cooling and alexitic. Used for burning, hallucination, leprosy, bronchitis, piles, leucorrhoea, and constipation; also acts as a laxative, stomachic, appetiser, and antipyretic. An emollient is made from the leaves. The root reduces menstrual flow and has warming and expectorant properties that are beneficial for leucorrhoea and leprosy [5].

Fig: 1 *Amaranthus viridis Linn*

Phtochemical Constituents

Studies reported the isolation of quercetin and lutein and rutin and β-carotene from *A. viridis*. And the isolation of amasterol, an ecdysone precursor and a growth inhibitor, from the roots of *A. viridis*. And the isolation of squalene from the stems and leaves; spinasterol from the stems and roots; and trilinolein , polyprenol , and phytol from the leaves of *A. viridis L*[6].

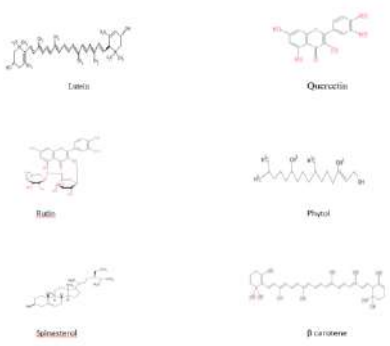

Fig: 2 Phyto chemical constituents of Amaranthus *Viridis Linn*

Pharmacological Activities

Antibacterial activity

Rama Koyyati *et al.*,(2014) reported that the antibacterial activity of silver nanoparticles against both gram positive negative bacteria was tested in liquid systems supplemented with

various quantities of nano-sized silver particles and in Luria-Bertani (LB) medium on solid agar plates. It has been established that these particles work well as a bactericide [7].

Anti-inflammatory activity

Elsaeed *et al.*,(2022) reported that, in carrageenan-induced rat paw oedema, the anti-inflammatory properties of ethanolic crude extracts of Amaranthus viridis whole plant were examined. According to the findings of the current investigation, Amaranthus viridis extract exhibits remarkable anti-inflammatory activity and is suggested for potential use as an anti-inflammatory treatment [8].

Antipyretic activity

Bagepalli Srinivas Ashok Kumar *et al.*,(2011) reported that the effects of the methanol extract of Amaranthus were equivalent to those of the common antipyretic medication paracetamol in terms of lowering yeast-induced increased body temperatures in rats [9].

Hepatoprotective activity

T.Sundarrajan *et al* (2017) reported the pharmacological assessment of the ethanol extract of Amaranthus viridis Linn (EEAV) in rats with hepatocellular carcinoma brought on by the flatoxin B1 (AFB1) indicated that it decreased the incidence of liver lesions, lymphocytic infiltrations, and hepatic necrosis. These findings imply that EEAV may be able to protect the liver from AFB1-induced oxidative damage in rats, possibly as a result of its ability to activate the in vivo antioxidant system [10].

Antimicrobial activity

Saud Asif Ahmed *et al.*,(2013) reported that the disc diffusion method was used to assess the antibacterial activity of the produced extracts. After the infected extracts were evaluated, a zone reader was used to look for inhibition zones (in mm), which indicate antimicrobial activity. The discs (6 mm in diameter) were then placed on infected agar after being impregnated with 20 g/ml sample extracts (20 g/disc). As a positive reference, rifampicine (20 g/disc) (Oxiod) and fluconazol (20 g/disc) (Oxiod) were utilised for bacteria and fungi, respectively [11].

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Anti-HMG-CoA Reductase, Antioxidant, and Anti-Inflammatory Activities

Shamala Salvamani *et al.,*(2016) reported thatthe Lineweaver-Burk plot study of A. viridis leaf extract showed that it had the largest HMGCoA reductase inhibitory effect, at around 71%, with noncompetitive inhibition. Nitric oxide (NO), ferric ion radicals, 2,2-diphenyl-1-picrylhydrazyl (DPPH), and hydroperoxides were all effectively inhibited by the leaf extract at various doses. The hyaluronidase, lipoxygenase, and xanthine oxidase enzymes have all been successfully inhibited by A. viridis leaf extract. The results of the experiments point to A. viridis leaf extract as a source of strong antioxidant and anti-inflammatory compounds. It may also influence cholesterol metabolism by inhibiting HMG-CoA reductase [12].

Antidiabetic, antihyperlipidemic and antioxidant activities

B.S. Ashok Kumar *et al.,*(2012) examined that the anti-diabetic, anti-hyperlipidemic, and antioxidant properties of the methanolic extract of the entire plant of Amaranthus viridis (MEAV) in diabetic rats that have been given the drug alloxan (ALX). In albino Wister rats, diabetes was identified five days after a single intraperitoneal injection of ALX (140 mg/kg). Following oral administration of MEAV (200 and 400 mg/kg) and glibenclamide (10 mg/kg, blood was drawn to measure total cholesterol (TC), total glycerides (TG), total proteins (TP), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), and very low density lipoprotein cholesterol (VLDL-C) . In order to test MEAV's in vivo antioxidant activity, liver tissues were homogenised [13].

Antihyperglycemic and hypolipidemic activity

Krishnamurthy Girija *et al.,*(2011) examined that the effects of the methanolic extract of leaves from Amaranthus viridis (MEAV) on hyperglycemia and lipid levels in normal and STZ-induced diabetic rats. The MEAV helps STZ-induced rats by lowering their high blood glucose levels, reversing body weight alterations, and enhancing their lipid profiles [14].

Reproductive functions

AFFY Mataphouet Emmanuel *et al.,*(2019) reported that the pharmacological effects and estrogenic characteristics of Amaranthus viridis leaves on the reproductive function in an animal model (female rat). The results of the current investigation indicate that estrogenic compounds are found in the methanolic extract of Amaranthus viridis. High estrogenic potential may be present at dosages of 200 and 400 mg/kg b.w, suggesting that this estrogenic potential may function through a dose-dependent mechanism. In order to revalue this plant, nevertheless, more research is necessary [15].

Antioxidant and antimicrobial activities

Muhammad Javid Iqbal *et al.,*(2012) reported that the purpose of this study was to determine the phenolics, antioxidant, and antimicrobial activities of leaf and seed extracts from the edible herb Amaranthus viridis L. The extract yields of active components from the leaves and seeds using pure and aqueous methanol. The extracts tested showed significant antimicrobial activity against selected bacterial and fungal strains, with MICs ranging from 179-645 g/ml. The seed extracts outperformed the other parts in terms of antioxidant and antimicrobial activity [16].

Conclusion

As per the review, it is concluded that the plant *Amaranthus viridis Linn* is having ample phytoconstituents i,e saponins, tannins, phenols, flavonoids, alkaloids, cardiac glycosides, steroids, and triterpenoids. Which are related to many pharmacological activities briefly discussed in this review.Chemical component in *A. vilidis L* has strong anti-inflammatory, antihepatotoxic, antiulcer, antiallergic, and antiviral properties. Additionally, they have antioxidant, antidiabetic, anti-HMG-CoA reductase, antibacterial, antipyretic and antihyperlipidemic properties.

Reference

1. Rupeshkumar M, Kavitha K, Haldar PK. Role of herbal plants in the diabetes mellitus therapy: An overview. Int J Appl Pharm. 2014;6(3):1-3.
2. Dara SK, Belamkar S. A review on anti-inflammatory and analgesic activity of herbal origin. Asian Journal of Pharmaceutical Research and Development. 2014 May 1:45-53.
3. Akbar S, Rahman R, Mushtaq A, Azeem MW, Al Mahruqi ZM. Slender Amaranth: A review on botany, chemistry, pharmacological importance and potential benefits.
4. viridis Linn A, caudatus Linn A, spinosus Linn A. Comparative antipyretic activity of methanolic extracts of some species of Amaranthus. Asian Pacific Journal of Tropical Biomedicine. 2011;47:S50.

SOUTH ASIAN ACADEMIC PUBLICATIONS

5. Rahman AH, Gulshana MI. Taxonomy and medicinal uses on amaranthaceae family of Rajshahi, Bangladesh. Applied Ecology and Environmental Sciences. 2014;2(2):54-9.
6. Uppugalla S, Srinivasan P. Polyaniline nanofibers and porous Ni [OH] 2 sheets coated carbon fabric for high performance super capacitor. Journal of Applied Polymer Science. 2019 Nov 5;136(41):48042.
7. Koyyati R, babuNagati V, Nalvothula R, Merugu R, Kudle KR, Marx P, Padigya PR. Antibacterial activity of silver nanoparticles synthesized using Amaranthus viridis twig extract.
8. Elsaeed AA, Mohamed OS, Ahmed RH. Anti-inflammatory effects of ethanolic extract of Amaranthus viridis against carrageenan induced paw oedema in Albino Rats.
9. viridis Linn A, caudatus Linn A, spinosus Linn A. Comparative antipyretic activity of methanolic extracts of some species of Amaranthus. Asian Pacific Journal of Tropical Biomedicine. 2011;47:S50.
10. Uppugalla S, Male U, Srinivasan P. Design and synthesis of heteroatoms doped carbon/polyaniline hybrid material for high performance electrode in supercapacitor application. ElectrochimicaActa. 2014 Nov 10;146:242-8.
11. Mohammed MJ, Marston CK, Popovic T, Weyant RS, Tenover FC. Antimicrobial susceptibility testing of Bacillus anthracis: comparison of results obtained by using the National Committee for Clinical Laboratory Standards broth microdilution reference and Etest agar gradient diffusion methods. Journal of Clinical Microbiology. 2002 Jun;40(6):1902-7.
12. Salvamani S, Gunasekaran B, Shukor MY, Shaharuddin NA, Sabullah MK, Ahmad SA. Anti-HMG-CoA reductase, antioxidant, and anti-inflammatory activities of Amaranthus viridis leaf extract as a potential treatment for hypercholesterolemia. Evidence-Based Complementary and Alternative Medicine. 2016 Jan 1;2016.
13. Kumar BA, Lakshman K, Jayaveea KN, Shekar DS, Khan S, Thippeswamy BS, Veerapur VP. Antidiabetic, antihyperlipidemic and antioxidant activities of methanolic extract of Amaranthus viridis Linn in alloxan induced diabetic rats. Experimental and toxicologic pathology. 2012 Jan 1;64(1-2):75-9.
14. Girija K, Lakshman K, Pruthvi N, Chandrika PU. Antihyperglycemic and hypolipidemic activity of methanolic extract of Amaranthus viridis leaves in experimental diabetes. Indian journal of pharmacology. 2011 Jul 1;43(4):450.
15. Male U, Uppugalla S, Srinivasan P. Effect of reduced graphene oxide–silica composite in polyaniline: electrode material for high-performance supercapacitor. Journal of Solid State Electrochemistry. 2015 Nov;19(11):3381-8.
16. Muhammad JI, Sumaira H, Zahed M, Farooq A, Amer J. Antioxidant and antimicrobial activities of Chowlai (Amaranthus viridis L.) leaf and seed extracts. Journal of Medicinal Plants Research. 2012 Jul 18;6(27):4450-5.