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Amaranthus spinosus Linn: A potential medicinal plant in Unani medicine

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Abstract
The genus Amaranthus belongs to the family Amaranthaceae, order Caryophyllales, and includes dicotyledonous annual plants and consists of approximately 70 species, which can be classified into grain and vegetable amaranths. In this article we discussed about various properties of *Amaranthus spinosus* Linn.

Keywords: *Amaranthus spinosus* Linn, Herbal, Diabetes

Introduction
The perceived deficiencies of essential vitamins and minerals present a significant restriction on human health and economic growth. Considering the importance of plants as one of the leading suppliers of bioactive dietary compounds, recent research focusing on superfoods as a nutraceutical and natural defender against chronic disorders has gained considerable attention [1].

Currently, there is a great interest in *Amaranthus*, a third-millennium tropical food plant [2]. The genus *Amaranthus* (L.) belongs to the family Amaranthaceae, order Caryophyllales, and includes dicotyledonous annual plants and consists of approximately 70 species, which can be classified into grain and vegetable amaranths. Most of the amaranth species are native to America and only 15 species originate from Asia, Africa, Australia, and Europe. The plant is adapted to grow under different agro-climatic conditions and reported to be heat, drought, and pest tolerant [3]. *Amaranthus* spp. can be found in subtropical, tropical, and temperate climate zones around the world. The crop demonstrated its capacity to cultivate both as a grain and leafy in those areas and seasons where other crops are unable to flourish [4].

In Ayurveda many medicinal plants has crucial role in blood purification, wound healing property and widely used in vitiated condition of vadha, pitta and kapha. Alkaloids are major secondary metabolite produced by plants and utilize it for defensive mechanism [5]. Thus in the present study quantification of alkaloids are done and analysed for their antimicrobial property. In the field of medicine, alkaloids are part of every medicinal scientist's resources and play an important role in treating diverse diseases. They are also a vital part of the successful regimens that have led to major therapeutic triumphs in chemotherapy. In pharmaceutical sciences, they serve as raw materials in the formulation of new and effective drugs [6]. Consumption of vegetables is closely related with the decrease risks of diseases that resulted from oxidative stress, including cancer, diabetes and various infectious diseases. Amaranth family composed of weedy plants, but they have got medicinal importance for the treatment of different ailments associated with human body. The plants are alexeteric, laxative, diuretic, stomachic, antipyretic, febrifuge, galactagogue, appetise and tonic. It is useful in vitiated conditions of pitta, burning sensation, leprosy, eczema, bronchitis, burns, boils, nausea and anaemia. Akaloids usually have pharmacological effects and are used in medicines or as recreational drugs [7]. Thus they are very useful pharmaceutical agents because of their biological activities such as antimicrobial, antioxidant analgesic potential and anti-inflammatory activities. The plants selected for the present study include the *Amaranthus spinosus* L., Amaranthus Caudatus L., Amaranthus tricolor L., Amaranthus dubius Mart., and Amaranthus viridis L. for investigation of valuable bioactive compounds especially quantification of alkaloids and possible utilization of the available species of Amaranthaceae growing in Kerala [8].

Morphology
Amaranthus spinosus Linn are erect, monoecious perennial, up to 1 m. Stem are terete or

obtusely angular, glabrous or slightly pubescent, green, reddish-brown, glabrous, and branched. The leaves alternate and are simple without stipules; petiole is approximately as long as the leafblade [9]. The blade shape is ovate-lanceolate to rhomboid, acute and often slightly decurrent at base, obtuse, rounded or slightly ret use and often short mucronate at apex, entire, glabrous or slightly pubescent on veins when young. The inflorencence are terminal and axillary, spike-like, erect, slender and elongated, with remote axillary spikes at base, lower clusters, pistillate, upper staminate. Bracteole are longer than or as long as tepal, scarious, ovate weakly spiny-tipped. Staminate flowers with 3, oblong-ovate, obtuse or acute or shortly spiny tipped tepals. Pistillate flowers with 1-1.5 mm long, white-membranous, acute or shortly spiny-tipped tepals [10].

Pharmacological actions

Antidiabetic

The ethanolic extract of *Amaranthus spinosus* leaves was administered (150, 300 and 450 mg/kg bw) to type-1 and type-2 diabetic rats. Standard drugs, glibenclamide and metformin were used as a positive control for comparison. Changes in carbohydrate and lipid metabolism and antioxidants were assessed and compared with control and standard drug treated animals. Higher doses of extract significantly decreased plasma glucose levels, hepatic glucose-6-phophatase activity and increased the hepatic glycogen content with a concurrent increase in hexokinase activity in both type 1 and 2 diabetic rats. It also significantly lowered the plasma and hepatic lipids, urea, creatinine levels and lipid peroxidation with an improvement in the antioxidant profiles of both type-1 and type-2 diabetic rats [11].

Hepatoprotective activity

The study show hepatoprotective activity of the 50% ethanol extracts of the whole plant of *Amaranthus spinosus* Linn. (Amaranthaceae) against d-galactosamine/lipopolysaccharide (d-GalN/LPS)-induced liver injury in rats was evaluated. d-GalN/LPS (300 mg/kg body weight/30 µg/kg body weight)-induced hepatic damage was manifested increase in the activities of marker enzymes (aspartate transaminase, alanine transaminase, alkaline phosphatase, lactate dehydrogenase and gamma glutamyl transferase) and bilirubin level in serum while phospholipids significantly decreased. All other parameters, i.e. cholesterol, triglycerides and free fatty acids were increased significantly in both serum and liver compared to the control group [12]. Pretreatment of rats with A. spinous extract (400 mg/kg) reversed these altered parameters to normal compared to the intoxicated group. The biochemical observations were supplemented by histopathological examination of liver sections. Results of this study revealed that A. spinosus extract could afford a significant protection against d-GalN/LPS-induced hepatocellular injury. The hepatoprotective and antioxidant activity of 50% ethanolic extract of whole plant of *Amaranthus spinosus* (ASE) was studied against carbon tetrachloride (CCl4) induced hepatic damage in rats. The ASE at dose of 100, 200 and 400 mg/kg were administered orally once daily for fourteen days. The substantially elevated serum enzymatic levels of serum glutamate oxaloacetate transaminase (AST), serum glutamate pyruvate transaminase (ALT), serum alkaline phosphatase (SALP) and total bilirubin were restored towards normalization significantly by the ASE in a dose dependent manner. Higher dose exhibited significant hepatoprotective activity against carbon tetrachloride induced hepatotoxicity in rats [13].

Antioxidant activity

Amaranthus spinosus roots were extracted successively with petroleum ether (80-100 °C), ethyl acetate and methanol by Soxhlet process. All the extracts were subjected to Total phenolic content, total flavonoid content and antioxidant activity using DPPH assay and Ferric Reducing Antioxidant Power assay (FRAP). Ethyl acetate extract showed the highest antioxidant activity with 61.47 ± 4.8 % inhibition at a higher concentration. The three solvents; Methanol, ethyl acetate and Petether extracts showed moderate activity when compared with the standard. In all, ethyl acetate extract generally, exhibited the highest values of antioxidants [14].

Anti-cholesterolemic activity

In the study, the anti-diabetic and anticholesterolemic activity of methanol extracts of leaves of Amaranthus caudatus, *Amaranthus spinosus* and Amaranthus viridis was evaluated by using normal and streptozotocin (STZ) induced diabetic rats at a dose of 200 mg/kg and 400 mg/kg p.o. daily for 21 days. Blood glucose levels and body weight were monitored at specific intervals, and different biochemical parameters, serum cholesterol, serum triglyceride; high density lipoprotein, low density lipoprotein and very low density lipoprotein were assessed. Histology of pancreas was performed. It was found that all the three plants showed significant antidiabetic and anti-cholesterolemic activity [15].

Analgesic and anti-inflammatory activity

The 50% ethanol extract (ASE) of *Amaranthus spinosus* (whole plant) has been studied for antinociceptive and antiinflammatory activities. The Analgesic and antiinflammatory activities were studied by measuring nociception by formalin, acetic acid, hot plate, tail immersion method while inflammation was induced by carrageenan. ASE had significant dose dependent percentage protection against acetic acid (0.6% of 10 ml) induced pain and the effects were also compared to aspirin morphine and naloxone while formalin induced pain (0.05 ml of 2.5%) was significantly blocked only at higher dose (400mg/kg) in first phase [16]. ASE significantly blocked pain emanating from inflammation at all the doses in second phase. The reaction time in hot plate was increased significantly and dose dependently where as pretreatment with naloxone rigorously reduced the analgesic potentials of ASE. Further in tail immersion test the same dose dependent and significant activity was observed. Aspirin had no effect on thermal induced pain i.e. hot plate and tail immersion tests but showed an effect on writhing test. This studied show that A. spinosus possess significant and dose dependant anti-inflammatory activity, it has also central and peripheral analgesic activity [17].

Diuretic activity

The diuretic potential of *Amaranthus spinosus* aqueous extract (ASAE) in rats was evaluated. Different concentrations of ASAE (200, 500, 1000, 1500 mg/kg), thiazide (10mg/kg) and vehicle were orally administered to rats (n=6 animals per group) and their urine output was collected after 24h. Volume, pH, Na+, K+ and Clconcentrations of urine were estimated. ASAE produced increase in Na+, K+, and Clexcretion, caused alkalinization of urine, and showed strong saluretic activity and carbonic anhydrase inhibition activity. These effects were observed predominantly at 500 mg/kg dose and suggested that

the A. spinosus is acting as a thiazide like diuretic [18].

Anti-hyperlipidemic activity

The anti-hyperlipidemic activity of methanol extracts of leaves of three plants of Amaranthus caudatus, *Amaranthus spinosus*, Amaranthus viridis were studied. It was found that all the three plants at 400 mg/kg dose showed significant anti-hyperlipidemic effect, whereas 300 mg/kg dose is less significant in the entire parameters used for evaluation of anti hyperlipidemic effect [19].

Antibacterial and cytotoxicity activity

Disc diffusion technique was used for in vitro antibacterial screening against gram positive and gram negative human pathogenic bacteria. In case of A. spinosus all extracts showed good antibacterial activity against both gram positive and gram negative & average zone of inhibition 8-15mm [20]. Ethanol and aqueous extracts of *Amaranthus spinosus* (roots) were investigated for their antibacterial activity against ten bacterial strains including Gram-positive and Gram negative bacteria using the agar-well diffusion method. The extracts tested, the ethanol extract presented the best results while the aqueous extract showed moderate inhibition of the microbial growth. Each extract is unique against different microorganisms [21].

Conclusion

Authors found that *Amaranthus spinosus* Linn. is an important medicinal plant with diverse pharmacological spectrum. The plant is widely used in traditional medicinal system of India and has been reported to possess antidiabetic, antipyretic, anti-inflammatory, antioxidant, hepatoprotective, antimalarial, antibacterial, antimicrobial, antidiuretic, antiviral and in hepatic disorders. The whole plant parts of the plant are known to contain medicinally active constituents.

References

1. Mishra SB, Verma A, Mukerjee A, Vijayakumar M. *Amaranthus spinosus* L. (Amaranthaceae) leaf extract attenuates streptozotocin-nicotinamide induced diabetes and oxidative stress in albino rats. A histopathological analysis. Asian Pacific J of Trop Biomed. 2012, 1647-1652.
2. Barku VYA, Opoku-Boahen Y, OwusuAnsah E, Mensah EF. Antioxidant activity and the estimation of total phenolic and flavonoid contents of the root extract of *Amaranthus spinosus*. Asian J of Plant Sci and Res 2013;3(1):69-74.
3. Jamaluddin ATM, Qais N, Ali MA, Howlader MA, Shams-Ud-Doha KM, Sarker AA. Analgesic activity of extracts of the whole plant of *Amaranthus spinosus* Linn. Int J of Drug Dev and Res 2011;3(4):189-193.
4. Ghosh D, Mitra P, Ghosh T, Mitra PK. Antipeptic ulcer activity of the leaves of *Amaranthus spinosus* L. in rats. Mintage J of Pharm and Med Sci 2013;2(3):52-53.
5. Mitra PK. Comparative Evaluation of Anti Gastric Ulcer Activity of Root, Stem and Leaves of *Amaranthus spinosus* Linn. in Rats. Int J of Herbal med 2013;1(2):1675-1680.
6. Chaudhary MA, Imran I, Bashir S, Mehmood MH, Rehman N, Gilani AHl. Evaluation of gut modulatory and bronchodilator activities of *Amaranthus spinosus* Linn. BMC Comp and Alter Med 2012;12:166-178.
7. Jhade D, Ahirwar D, Jain R, Sharma NK, Gupta S. A Pharmacological Review: *Amaranthus spinosus* L. Res J Pharmacognosy and Phytochemistry 2009;1(3):169-172.
8. Oya GN, Uygur FN. A New Record for the Flora of Turkey *Amaranthus spinosus* L. (Amaranthaceae). Turk J Bot 2000;24:359-360.
9. Xian S. Amaranthus Linnaeus. Flora of China. 2003;5:417-421. Manik B. Anatomical and Histological Study of Stem, Root and Leaf of the Medicinal Plant *Amaranthus spinosus* Linn. J of Pharma Sci Tech 2013;2(2):68-71.
10. Manik B, Ankur D, Subrata C, Pranabesh C. Pharmacognostic studies on stem and leaves of *Amaranthus spinosus* Linn. Int J of Applied Bio and Pharma Tech 2011;2(1):41-47.
11. Hussain Z, Amresh G, Singh S, Rao CV. Antidiarrhoeal and antiulcer activity of *Amaranthus spinosus* in experimental animals. Pharmaceutical Biology. 2009;47(10):932-939.
12. Girija K, Lakshman K, Udaya C, Sabhya SG and Divya T. Anti-diabetic and anti-cholesterolemic activity of methanol extracts of three species of Amaranthus. Asian Pac J Trop Biomed. 2011;1(2):133-8.
13. Amuthan A, Chogtu B, Bairy KL, Sudhakar, Prakash M. Evaluation of diuretic activity of *Amaranthus spinosus* Linn. aqueous extract in Wistar rats. J Ethnopharmacol 2012;140(2):424-427.
14. Zeashan H, Amresh G, Singh S, Rao CV. Protective effect of *Amaranthus spinosus* against Dgalactosamine/lipopolysaccharide induced hepatic failure. Pharm Biol 2010;48(10):1157-1163.
15. Zeashan H, Amresh G, Singh S, Rao CV. Hepatoprotective activity of *Amaranthus spinosus* in experimental animals. Food Chem Toxicol. 2008;46(11):3417-3421.
16. Zeashan H, Amresh G, Singh S, Rao CV. Hepatoprotective and antioxidant activity of *Amaranthus spinosus* against CCl4 induced toxicity. J Ethnopharmacol. 2009;125(2):364-366.
17. Zeashan H, Amresh G, Rao CV, Singh S. Antinociceptive activity of *Amaranthus spinosus* in experimental animals. J Ethnopharmacol. 2009;122(3):492-496.
18. Olumayokun AO, Babatunde RO, Temitope OE. Anti-inflammatory Properties of *Amaranthus spinosus* Leaf Extract. Pharmaceutical Biology. 2004;42(7):521-525.
19. Sangameswaran B, Jayakar B. Anti-diabetic, anti-hyperlipidemic and spermatogenic effects of *Amaranthus spinosus* Linn. on streptozotocininduced diabetic rats. J Nat Med 2008;62(1):79-82.
20. Girija K, Lakshman K. Antihyperlipidemic activity of methanol extracts of three plants of Amaranthus in triton-WR 1339 induced hyperlipidemic rats. Asian Pacific J of Trop Biomed 2011;1(1):62-65.
21. Harsha VS. In vitro antibacterial activity of *Amaranthus spinosus* root extracts. Pharmacophore 2011;(5):266-270.