



NEPHROPROTECTIVE ACTIVITY OF *AZIMA TETRACANTHA* (SALVODARACEAE): A REVIEW

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ABSTRACT

The impact of renal failure on human health is common in all age groups now days and still there occurs restriction in pharmacotherapy. This review focuses the updated information about the nephroprotective activity of *Azima tetracantha*. Investigators reported that the whole plant of *Azima tetracantha* is being used for treating various disease. In Siddha and Ayurveda this drug is used as one of the ingredient in many formulations. In particular the root bark is used as a potent nephroprotective drug. This review article gives the compiled data of *Azima tetracantha* and this documentation will be a key for the researchers to explore its mechanism as a nephroprotective drug.

KEYWORDS: Pharmacotherapy, Nephroprotective.

INTRODUCTION

Azima tetracantha (Salvadoraceae) known for its diverse therapeutic activity being used in the indigenous system of medicine to treat various ailments. Plants which are the integral part of traditional medicine being used extensively for various disease which are evidenced nowadays by their *in-vitro* and *in-vivo* activities.

Nephrotoxicity is caused by various nephrotoxins such as toxic chemicals due to some medications and also by the foods which produces free radicals. Nephrotoxins will decrease the creatinine clearance, which in turn indicates poor renal function. The level of creatinine in blood and urine is used to calculate the creatinine clearance which is used to calculate glomerular filtration rate (GFR). Some fruits and vegetables such as *Carica papaya*, *Coccus nucifer*, *Phyllanthus embelica*, *Hibiscus esculentus*, *Moringa oleifera*, *Daucas carota*, give protective effect to nephrons.^[1] One of the herbal drug *Azima tetracantha* known as *mulchangu* in Siddha, *kundali* in Ayurveda and Needle brush in English. The whole plant parts is being used to treat various diseases which possess diuretic, anti-inflammatory, antioxidant, antispasmodic, expectorant, hepatoprotective, stimulant, antiperiodic, astringents.^[2] This review focus on the root bark which is a potent diuretic, used in treatment of rheumatism, dropsy, dyspepsia chronic diarrhoea, dysfunctional uterine bleeding, infertility in women, Snake bite (root paste is applied on affected body part

and infusion of roots is given internally) and stomach disorders.^[3] The root barks juice along with goat milk acts as a very good diuretic.^[4]

Plant Classification^[2]

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Brassicales
Family : Salvadoraceae
Genus : *Azima*
Species : *tetracantha*

Distribution

Azima tetracantha is a perennial shrub growing upto and height of 3m, found mainly in hot, dry riverine scrub especially in alluvial or saline soil. It is found in central, eastern and southern Africa, in Indian Ocean Island spreading through Arabia to topical Asia.^[5]

Morphological Description

It is a scrambling, deciduous, dioecious shrubs, with axillary spines. Branches: Green herbaceous, the branch lets are divaricated and tetragons. Young shoots pubescent, glabrous afterwards; spines in each axil 1-2 in. number Bark: Light brown, rough, wood white, soft, consisting of concentred layers in which the pores, surrounded by white loose tissue, are alternately scanty and many. It grows up to two meters height. Leaves

simple, opposite, elliptic, acute, sessile and shiny. Leaves are surrounded by four sharp thorns, flowers seen in axillary panicles, small and white. Fruits are single seeded berries. Root barks are thick no deep fissures seen.^[6]

Pharmacognosy of *Azima tetraantha*

The transverse section of leaves is reported for the absence of trichomes presence of anisocytic stomata, midribs with hyalane mass. Root bark has superficial periderm and wide secondary phloem, no deep fissures, cells are thick walled and tubular shaped with radial arrangement.^[7]

Ayurveda and Siddha Reference

The Sanskrit synonym for *Azima tetraantha* is kundali. The ayurvedic properties are

Rasa (taste) – Tikta (bitter), Madhura (sweet)
Guna (nature) – Lakhu (easily digestible)
Virya (potency) – Ushna (hot)
Vipaka (taste after digestion) – Madhura^[8]

Root bark is used in the treatment of anaemia, eczema, increased metabolic rate, gastritis, ascites with pedal oedema, increased vatha disorder, to treat eye disorders, to increase haemoglobin level, respiratory tract infection, syphilis, increased body temperature, intestinal worms and it also acts as a potent diuretic.^[4]

Formulations	Treatment Of
Sarvangavathachooranam	All vatha disorders ^[9]
Megasantichoornam	Skin diseases, joint pains, syphilis. ^[9]
Vishamusti Thailam ^[10] and Mahavishamustithailam ^[11]	Rheumatic pain and neurological disorder.
Rajasinthamanithailam	Syphilitic rheumatism and gonorrhoea. ^[12]
Sarvameghathailam	Various skin diseases, STD, lymphadenitis ^[12]
Sangamver Thailam	Hair fall, alopecia, dandruff, scalp itching. ^[13]
Nirkundithailam	Tuberculosis and other respiratory disorders. ^[11]
Kodiviverthailam	Leucorrhoea treatment. ^[10]
Sivanar Vembu	Paralysis, itching, inflammation, respiratory disorders, urticaria, sexually transmitted disease. ^[12]

Ethnomedical use

Root bark paste with cow milk or goat milk for 3 – 7 days to treat anaemia,^[13] Crushed roots and leaves are warmed mildly and applied for rheumatoid arthritis, Paste made from roots is used to treat wound, root powder to treat toothache.^[14] Root bark powder along with other ingredients used to treat 96 vatha disorders.^[15]

Phytoconstituents

Whole plant is reported to have alkaloids azimine, azacarpine and carpine.^[16] root and fruit is reported for the presence of glycosides N-methoxy-3-indolylmethylglucosinolate, indole glucosinolate and N-methoxy indole 3- corbinol, root and stem is reported for the presence of flavonoids, myricetin, quercetin, rutin, isorhamnetin, rhamnetin and rhamnazin.^[17]

Pharmacological Use of Leaves and Stem

Nephroprotective activity^[3]

The leaf extract is reported for nephroprotective activity in ferrous sulphate ingested rat model. Drug induced rise in biochemical parameters such as urea, GGT and creatinine were declined after treating with leaf extract as that of control.

Antidiarrhoeal activity^[18]

The study evaluating friedelin isolated from leaves of *Azima tetraantha* using castor oil incited diarrhoea and enteropooling. Friedelin indicated noteworthy decrease of intestinal and gastric exhausting which were like the

counter motility movement as known compound atropine (0.1mg/kg).The outcomes clarified that the counter diarrhoeal action of friedelin might be because of its antisecretory and antimotility property. A study^[19] with aqueous extract of ATR at a dose of 100mg/kg is effective as that of the standard drug loperamide .The result were concluded as that the castor oil ingested loose stool and enteropooling are markedly reduced by the aqueous extract.

Antioxidant activity^[20]

The successive leaf extracts obtained from petroleum ether, hexane, ethyl acetate, methanol using *in vitro* free radical scavenging models such as DPPH, nitric oxide radical, superoxide anion,hydroxyl radical scavenging assays, lipid peroxidation inhibition assay. The methanolic extracts fights against the free radicals in synergistic way with other compounds and in this manner comprise the reason for ethno pharmacology use.

Analgesic activity^[21]

The study of analgesic activity of leaf powder isolated with benzene, chloroform and aqueous using hot plate method in mice. A dose of 100mg/kg body weight calculating the response time at 15, 30, 60 min. The result revealed that the analgesic action was found at 30min after medication which was close to morphine sulphate.

Antipyretic activity^[22]

The report of antipyretic activity of the leaf extract at a dose of 100, 200 mg/kg diminished the subcutaneous yeast induced rise of temperature in rats. This impact was maximal at portion of 200 mg/kg and it caused critical bringing down of body temperature as long as 4 hour after its injection. The antipyretic impact began as right on time as 1h and the impact was kept up for 4h, after its injection. Both the standard medication paracetamol 25 mg/kg and tried medication *Azima tetracantha* decreased the yeast raised rectal temperature.

Anticancer activity^[23]

The study carried using the leaves and stem extract with hexane and ethanol. Anticancer potency of different concentrates were examined with standard MTT colorimetric technique against MCF-7 cell lines. Anticancer action of *Azima tetracantha* leaf ethanolic extract on Ehrlich Ascites Carcinoma (EAC) in mice evaluated⁽²⁴⁾, uncovered that there was a critical decline of viable tumor cell and noteworthy increment of non-viable tumor cell at a dose of 200mg/kg.

Bioactivity of Root**Antimicrobial activity**^[25]

A study utilizing different extracts such as hexane, chloroform, ethyl acetate and methanol against gram positive bacteria, gram negative bacterial strain and fungal species using disc diffusion method showed contrasting anti-microbial movement. The investigation reasoned that methanolic root concentrate had a potential anti-microbial movement against pathogenic strains.

Anti-oxidant activity^[26]

The study of different root extracts obtained by methanol, hexane, chloroform, ethyl acetate utilizing invitro assays such as DPPH, ABTS, Hydroxyl radical and super oxide anions. The phenolic substance and ferric decreasing anti-oxidant potential of the concentrates were studied by utilizing standard phytochemical methods. The outcomes uncovered that the distinctive root extract has a potential anti-oxidant activity.⁽¹⁷⁾ A study reported antioxidant activity of ethanolic root extract by spectrophotometrical method using vitamin C as positive control.

Nephro-protective activity^[17]

The biochemical markers of nephrotoxicity are increased urea, creatine decreased protein, albumin and urine output. The evaluation report of nephroprotectivity in glycerol injected albino rats using ethanolic root extracts, the hoisted nephrotoxic circumstance initiated to nephrons is restrained in Wister albino rats and it also reverted the histopathological changes in extract treated animals.

Antiepileptic activity^[27]

A study of pentylenetetrazole induced convulsion had been protected by ethanolic root extract effectively by delaying the onset of convulsion and also defensive

against mortality in 50% of animals, same as that of Sodium valproate treated animals. In maximal electroshock model their occurred effective protection by decreasing the period of hind limb extension and also by prevention against death.

Hepatoprotective activity^[28]

A study on hepatoprotective activity reported with the hydroalcoholic root extract of *Azima tetracantha* showed a noteworthy protection against CCL4 prompted hepatocellular damage in rats. The bio chemical parameters of such as SGOT, SGPT alkaline phosphatase (ALP) and acid phosphatase, total bilirubin increases in CCL4 administration after 36hrs. In extract treated animals their elevation in serum occurred after 7 days and also damaged hepatic cells are restored at doses 40, 80 and 120 mg/kg.

CONCLUSION

In the present review gives the compiled data of *Azima tetracantha* for the presence of bioactive compounds such as alkaloids, steroids, tannins, terpenoids, glycosides, phenolic compounds. The plant reported to have antioxidant, antifungal, antibacterial, hepatoprotective, antidiabetic, antiepileptic activities. Due to the presence of flavonoid compounds it exhibits a potent nephroprotective activity.

REFERENCES

1. Naansi Agnes Leo, Velpandian Venkatachalapathi, Pitchiahkumar Murugan, Geetha Aasaitambi, Banumathi Vellaian. Nephro Protective Fruits and Vegetables – A review. European Journal of Pharmaceutical and Medical Research, 2015; 2(6): 116-119.
2. Sundaresan Nandhini, Ramalingam Radha, Pharmacognosy of *Azima tetracantha* Lam. (Salvadoraceae) A Review International Journal of Ayurveda and Pharma Research, 2015; 3(12): 13-19.
3. S. Manikandaselvi, D. Ramya, R.Ravikumar and R.Thinagarbabu. Evaluation of Antinephrotoxic Potential of *Azima tetracantha* Lam. and Tribulus Terrestris Linn. International Journal of Pharmacy and Pharmaceutical Sciences, 2012; 4(3): 566-568.
4. Murugesu mudhaliar Siddha material medica, Medicinal plants division, Gunapadam, part- I, Indian system of medicine and Homeopathy, Chennai, edition, 2008; 414-416.
5. Sundaresan Nandhini, Ramalingam Radha, vijayabharathi Rajkishore. Pharmacognostical studies of *Azima tetracantha* Lam (salvadoraceae). A review. World Journal of Pharmaceutical sciences, 4(4): 99-107.
6. Kundali (*Azima tetracantha*) Information, classification and medicinal uses. <https://www.bimbima.com/herbs/azima-tetracantha/3603/>.
7. M. Balakrishnan, R. Dhanapal, M. Lakshmi Mohan Vamsi, K.B. Chandra Sekhar. Studies on

- Pharmacognostical specifications of *Azima tetracantha* Lam. International Journal of Phytopharmacology, 2010; 1(1): 35-42.
8. *Azima tetracantha*, dhaarrii.blogspot.com/2009/09/azima-tetracantha.htm.
 9. Kannusamy Pillai, Sigicharatra Deepam, Published by Rathnanaicker and sons, Chennai. Edition, 2007; 1: 109-164.
 10. Pulipanni aruliya vaithiya saram-500., Edited by Udhayaventhan, edition, 2008; 50,65.
 11. Thairaiyar thailavarga surukam, edited by C.T.Subramaniyapandithar. Edition, publisher Ratna naicker and sons, 2006; 95; 53-54.
 12. Kannusamy Pillai, Kannusamy parabarai vaithiyam, edition 2006, Published by Rathnanaicker and sons, Chennai, 272.
 13. Hakkim-P.M.Abdullahshahib, Anuboga vaithiya navanitham, published by Thamarainoolagam, Chennai. publishing year, 2002; 10: 5,6,108.
 14. TR Prashith Kekuda, HL Raghavendra. Phytochemistry, traditional uses, and pharmacological activities of *Azima tetracantha* Lam. (Salvadoraceae)-An updated review. International journal of Green Pharmacy, 2017; 11(4): 217-228.
 15. Uyir kakum siddha maruthuvam, Athmaratchamiratham vaithiya sarasangiram, edition, editor S.P.Ramachandran, 2000; 327.
 16. B. Vinoth, M. Gomathinayagam, Rengarajan Manivasagaperumal. Screening of Phytochemical and Antimicrobial Activities of *Azima tetracantha* Lam. Leaf Extracts. International Journal of Pharma Research & Review, 2014; 3(10): 1-7.
 17. Venugopala Rao Konda, Ruckmani Arunachalam, Madhavi Eerike, Ramesh Rao K, Arun Kumar Radhakrishnan, Lakshmi pathy Prabhu Raghuraman, Vinayak Meti, Sobita Devi. Nephroprotective effect of ethanolic extract of *Azima tetracantha* root in glycerol induced acute renal failure in Wistar albino rats. Journal of Traditional and Complementary Medicine, 2016; 6: 347-354.
 18. Paulrayer Antonisamy, Veeramuthu Duraipandiyar, Savarimuthu Ignacimuthu, Jong-Hoon Kim. Antidiarrhoeal activity of friedelin isolated from *Azima tetracantha* Lam. in Wistar rats. South Indian Journal of Biological Sciences, 2015; 1(1): 34-37.
 19. V. Hazeena Begum, M. Dhanalakshmi and P. Muthukumar. In vivo evaluation of antidiarrhoeal activity of the leaves of *Azima tetracantha* Linn. International Journal of Nutrition and Metabolism, 2013; 5(8): 140-144.
 20. B. Thendral Hepsibha, S. Sathiya, C. Saravana Babu, V. Premalakshmi and T. Sekar. Invitro studies on antioxidant and free radical scavenging activities of *Azima tetracantha*. Lam leaf extracts. Indian Journal of Science and Technology, 2010; 3(5).
 21. T. D. Nandgude, A. P. Bhojwani and Krishna Kinage. Analgesic activity of various extracts of leaves of *Azima tetracantha* Lam. International Journal of Green Pharmacy, 2007; 1(1):
 22. Tajuddin Nargis Begum, Mohamed Hussain Muhammad Ilyas And Arumugam Vijaya Anand. Antipyretic activity of *Azima tetracantha* in experimental animals. International Journal of Current Biomedical and Pharmaceutical Research, 2011; 1(2): 41 – 44.
 23. Nandhini Sundaresan, Ramalingam Radha and Periyannan Muthusamy. Invitro Anticancer activity of leaves and stem of *Azima tetracantha* Lam. World Journal of Pharmacy and Pharmaceutical Sciences, 2016; 5(3): 1242-1246.
 24. T. Nargis Begaum, M.H Muhammad Ilyas, S.Kalavathy, A.Vijaya Anand, P.Sampath Kumar and R. Senthil. Effects of Ethanolic Leaf Extract of *Azimatetracantha* Lam. On Ehrlich Ascites Carcinoma Tumour Bearing Mice. Research Journal of Medicine and Medical Sciences, 2009; 4(2): 351-354.
 25. B. Vinoth and R. Manivasagaperumal. Antimicrobial activity of different extracts of *Azima tetracantha* root. International Journal of Pharma and Bio Sciences, 2015; 6(2): 613 – 620.
 26. B. Vinoth, R. Manivasagaperumal and P. Prakash. Free Radical- Scavenging Potential of Different Extracts from *Azima tetracantha* Lam. Int. J. Res Ayurveda Pharm, 2015; 6(1): 131-137.
 27. Madhavi Eerike, Venu Gopala Rao Konda, Ruckmani Arunachalam, Umar Dawood. Evaluation of Antiepileptic activity of Ethanolic Extract of *Azima tetracantha* Root in Mice. International Journal of Current Pharmaceutical Research, 2016; 8(4):76-79.
 28. M.Balakrishnan, R.Dhanapal, K.B.Chandra sekhar. Hepatoprotective activity of root bark of *Azima tetracantha* against carbon tetra chloride (CCL4) – Induced Hepatotoxicity in Wister male Albino rats. International Journal of Biological and Pharmaceutical Research, 2012; 3(3): 366-372.