



## 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.<sup>[1]</sup> 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.<sup>[2]</sup> 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.<sup>[3]</sup> The root barks juice along with goat milk acts as a very good diuretic.<sup>[4]</sup>

### Plant Classification<sup>[2]</sup>

Kingdom	:	Plantae
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Order	:	Brasicales
Family	:	Salvadoraceae
Genus	:	<i>Azima</i>
Species	:	<i>tetracantha</i>

### 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.<sup>[5]</sup>

### Morphological Description

It is a scrambling, deciduous, dioecious shrubs, with axillary spines. Branches: Green herbaceous, the branchlets 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 concentrated 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 thrones, flowers seen in axillary panicles, small and white. Fruits are single seeded berries. Root barks are thick no deep fissures seen.<sup>[6]</sup>

#### **Pharmacognosy of *Azima tetracantha***

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

#### **Ayurveda and Siddha Reference**

The Sanskrit synonym for *Azima tetracantha* 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<sup>[8]</sup>

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.<sup>[4]</sup>

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

#### **Ethnomedical use**

Root bark paste with cow milk or goat milk for 3 – 7 days to treat anaemia,<sup>[13]</sup> 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.<sup>[14]</sup> Root bark powder along with other ingredients used to treat 96 vatha disorders.<sup>[15]</sup>

#### **Phytoconstituents**

Whole plant is reported to have alkaloids azimine, azacarpine and carpine.<sup>[16]</sup> root and fruit is reported for the presence of glycosides N-methoxy-3-indolylmethyl-glucosinolate, 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.<sup>[17]</sup>

#### **Pharmacological Use of Leaves and Stem**

##### **Nephroprotective activity<sup>[3]</sup>**

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 where declined after treating with leaf extract as that of control.

##### **Antidiarrhoeal activity<sup>[18]</sup>**

The study evaluating friedelin isolated from leaves of *Azima tetracantha* 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<sup>(19)</sup> 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<sup>[20]</sup>**

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<sup>[21]</sup>**

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<sup>[22]</sup>**

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<sup>[23]</sup>**

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<sup>(24)</sup>, 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<sup>[25]</sup>**

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<sup>[26]</sup>**

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.<sup>(17)</sup> A study reported antioxidant activity of ethanolic root extract by spectrophotometrical method using vitamin C as positive control.

**Nephro-protective activity<sup>[17]</sup>**

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<sup>[27]</sup>**

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<sup>[28]</sup>**

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.

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