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# *Asteracantha longifolia* Linn: An Overview

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## ABSTRACT

*Asteracantha longifolia* (L.) Nees. belonging to the family Acanthaceae is known as Talmakhana in Unani and Kokilasha in Ayurveda system of medicine. It is found in India, Srilanka, Burma and Nepal. The plant contains alkaloids, flavonoids, terpenoids, essential oil and phytosterols. It has been using in traditional systems of medicine since centuries for the treatment of diseases like low libido, premature ejaculation, ascites, jaundice and diseases of urogenital tract etc. Many pharmacological studies have been conducted on *Asteracantha longifolia* which proved its aphrodisiac, hepatoprotective, antioxidant and analgesic activities etc. In this review, an attempt has been made to present its phytochemical, pharmacological and other important aspects.

**Key words:** *Asteracantha longifolia*, Talmakhana, aphrodisiac, Ayurveda, Unani.

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# INTRODUCTION

*Talmakhana* is the seeds of plant *Asteracantha longifolia* (L.) Nees. syn. *Hygrophila spinosa, H. auriculata* (Schum.) Hiene is most commonly used as an aphrodisiac drug in Unani as well as in Ayurveda systems of medicine since antiquity. It is a small, spiny weed found in moist places throughout India.[1] The plant is widely distributed in India, Srilanka, Burma and Nepal. [2] The Plant Seeds, root and leaves are used for medicinal purpose. Seeds are aphrodisiac, semenogogue while root and leaves are diuretic in nature. *Talmakhana* is extensively used in Unani system of medicine for various ailments like oligospermia, low libido, premature ejaculation, ascites, hepatic obstructions, gonorrhoea, diseases of urogenital tract, and rheumatism etc.[1,3,4] In Ayurveda system of medicine *Asteracantha longifolia* (L.) Nees is described as ikshura, ikshugandha and kokilasha, "having eyes like the Kokilaor Indian Cuckoo". *Asteracantha longifolia* (L.) Nees finds mention in Ayurvedic treatise like 'Sushruta Samhita' and 'Charka Samhita' as Rasayan or rejuvenator. The word Rasayana is composed of two words 'Rasa' meaning elixir and 'Ayana' meaning house. The word therefore signifies property of the plant that helps to rejuvenate the system. Many plants have been broadly used as 'Rasayana' drugs in Ayurveda for the management of neurodegenerative diseases, as rejuvenators, immunomodulators, aphrodisiac and tonic.[5, 6] It is also scientifically proved to have a variety of pharmacologic functions, which indicate its usefulness in the treatment of different types of diseases and disorders.

**Botanical Name**

*Asteracantha longifolia* (L.) Nees.[1, 7, 8, 9, 10]

**Synonym**

*Hygrophila spinosa* T Anders., *H. auriculata* (Schum.) Hiene [1, 7, 8, 10]

**Taxonomy** [11]

Kingdom: Plantae

Division: Angiospermae

Order: Personales

Family: Acanthaceae

Genus: *Asteracantha*

Species: *longifolia*

**Vernacular Names**

Unani: Talmakhana;[8] Ayurveda: Kokilaksha, Ikshura,Bhikshu; [8] Siddha: Nirmuli , Neerugubbi; [8] Urdu: Talmakhana; [1,12] Hindi: Talmakhana, [7,10] Gokhula-kanta, Gokshura;[1] Assamese: Kulekhara; [1]Marathi: Talimakhana; [1,7] Kannada: Kolayalike ; [1] Bengali: Tuliakhara, Kamlakalika, Kuliakhara Bhikshu, Shrigali, Pushpa;[1] Malayalam: Vayalculli;[1] Oriya: Koillekha, Koilrekha;[1] Punjabi: Talmakhana, Talimakhana; [1] Sanskrit: Kokilaksha,[7,10] Kolistha, Ikshugandha, Atichhatra;[1] Tamil: Nirmuli;[1,7] Telugu: Neerugubbi; [1,7] Kashmiri: Talimakhana, Talmakhana[1]

**Habitat**

Common in moist places, paddy fields, throughout India, Nepal, Burma and Srilanka. [2, 8]

**Botanical Description**

*Asteracantha longifolia* (L.) Nees is an herb grows in wet places. A stout herb; stems fasciculate, subquadrangular, erect, 150 cm tall, thickened at the nodes, hispid with long hairs; with axillary spines; leaves 9 × 1 cm, hairy, oblanceolate, in whorls (Figure 1). Flowers 2–3 cm long, purple-blue, bilabiate, in whorls (Figure 2).

**Figure: 1** *Asteracantha longifolia* Linn. Plant

**Figure: 2** *Asteracantha longifolia* Linn. flower

**Figure: 3 *Asteracantha longifolia* Linn. seeds**

Fruits capsule, 8 mm long, 4–8 seeded, root is conical and hairy.[13] Seeds are small, brown, 4.0 to 6.0 mm wide, much flattened and truncated at base, ovate-cordate in appearance, smooth when dry; if soaked in water and examined immediately under low power, adpressed trichomes star spreading and radiate all around the seeds except at the truncated part[1] (Figure 3).

**Parts used**

Seeds, root and leave. [1, 3, 4,7,10, 12]

DOSAGE:

**Seeds:** 7 to 10 grams,[3] 5 to 10 grams,[1] 5 to 7 grams [4]

**Decoction of leaves:** 140 ml[3]

**Decoction of root:** 60 ml[3]

**Actions Mentioned in Unani Medicine**

*Mughallize* mani[4,11], *muallide mani* (spermatogenic),[1,3,12] *muqawwie bah* (aphrodisiac), [1,3,4,*12*] *mudirre baul* (diuretic)[1,3,12], *mufattehe sudad* (deostruent),[3] *muskkine alam* (analgesic)[3,12] *musammine badan* [4]

**Uses In Unani Medicine**

**Seeds:** Powder of seeds with milk is useful in *jiryan* (spermatorrhoea), *riqqate mani*, [4,12] *surate inzaal* (premature ejaculation), *qillate mani* (oligospermia) ,[12] and *suzak* ( gonorrhoea) .[3]

**Leaves**

- Decoction of leaves is beneficial in *istisqa* (ascites) *yarqan* (jaundice), *qabz* (constipation) and *dared dandan* (toothache). [3, 12]
- *Zimad* (Paste) of Leaves is useful in *wajaul mafasil* (rheumatoid arthritis) and *wajauz zahar* (low backache).[3, 12]

**Root:**Decoction of root is useful in *istisqa* (ascites) and urogenital diseases.[3]

**Important Formulations In Unani**

*Halwae suparipak, sufoofe beejband and sufoofe jiryan khas* [1] etc.

**Ethnobotonical Description**

**Actions**

Aphrodisiac,[9,14] antiinflammatory,[9, 14] diuretic,[9, 14] demulcent,[14] anticonvulsant, antineoplastic, hepatoprotective, antitumour. [14, 15]

**Therapeutic uses**

seminal debility,[9] sexual debility,[9] dropsy,[5, 7, 9], rheumatism,[5, 7] diarrhoea,[9] dysentery,[9] urinary calculi,[9] urinary discharges,[5, 7, 9] veneral diseases,[5, 7, 9] jaundice,[7] anasarca.[5]

**PHYTOCHEMICAL STUDIES**

Many Phytochemical studies have been done to elucidate the chemical constitution of

*Asteracantha longifolia*. Seeds contain mucilage, potassium salts, diastase, lipase, protease[5,6,15,16,20,21,22,23], sterols[19,21,22,24,25,26,27], alkaloids, fixed oils[5], fatty acids[28] and minerals like Ca, Mg, K, Fe, Cu, Zn, Mn, Co and Cr.[18]

Whole plant contains essential oil,[19] a straight chain ketone[29] and alkaloids.[16] Leaf contains proteins, nitrogen, polyphenols,[30] minerals as Ca, Mg, K, Fe, Cu, Zn, Mn, Co and Cr[18,35] glycosides, reducing sugars,[31] acacetin, proanthocyanins, phenolic acid[21]; hydrocarbons[19,32,33], alkaloids, mucilage, potassium salts, sugars, purine alkaloid,[1,6,25,26,34] flavonoids, terpenoids[36], manganese salts, potassium chloride and sulphate, fixed oils [34] are reported in the plant without any specification of the morphological part of the plant and ash from the root contains potassium salts.

Root of the plant contains essential oils[6, 15, 16], alkaloids[5,] waxy substances, gum,[17] minerals as Ca, Mg, K, Fe, Cu, Zn, Mn, Co and Cr[18] and phytosterols.[15]

**SCIENTIFIC REPORTS**

Many pharmacologic studies have been conducted on *Asteracantha longifolia*. A summary of these findings by various investigators is described briefly in the following sections.

**Aphrodisiac activity:**

The ethanolic extract of *talmakhana* seeds showed androgenic activity as well as improvement of sexual behaviour of rat in dose dependent manner, it also improve the histoarchitecture of testis and increase the concentration of sperm count in epididymis and also increase testosterone level.[37]

**Anti-tumour activity:**

A study was carried out by Mazumdar et.al, reported that petroleum ether extract of the roots exhibited antitumor activity in Ehrlich ascites carcinoma (EAC) and sarcoma-180 (S-180) bearing mice. The extract suppressed significantly the tumour fluid volume at the end of a 3 weeks experiment. It decreased about 50% of packed cell volume and increased the life span of EAC/S-180-bearing mice in a day-dependent manner. Red blood cell (RBC) count, haemoglobin content, and white blood cell count significantly increased to normal after extract treatment of the tumour bearing mice. It also inhibited the rapid increase of the body weight of tumour bearing mice. This finding supports its traditional use in cancer and blood disorders.[2]

**Anti-inflammatory activity:**

Petroleum ether, chloroform, alcoholic, and aqueous extracts of the leaves of *Asteracantha longifolia* were evaluated for their anti-inflammatory effect in Wistar rats of both sexes. The results revealed that chloroform and alcoholic extracts significantly reduced the carrageenin

induced rat paw oedema in a dose dependent manner, whereas petroleum ether and aqueous extracts did not show any significant anti-inflammatory activity. The obtained result supported the traditional claim of the plant for its anti-inflammatory properties.[38]

**Anti-pyretic activity:**

In an experimental study petroleum ether, chloroform, alcohol, and aqueous extracts of *H. spinosa* leaves were evaluated for their antipyretic activity on the basis of their effect on Brewer's yeast induced pyrexia in rats at doses of 200 and 400 mg/kg. The results showed that chloroform and alcohol extracts have significant antipyretic activity, but petroleum ether and aqueous extracts failed to lower the raised body temperature in rats. Chloroform extract significantly decreased the elevated rectal temperature 3 hour after the administration of a dose of 400 mg/kg; whereas the alcoholic extract reduced the hyperthermia at both doses, 1 hour after administration.[38]

**Antidiabetic activity:**

In a study, the hypoglycemic activity of *H. auriculata* in diabetic rats was reported. Treatment of streptozotocine induced diabetic rats with ethanolic extracts from the aerial parts of *H. auriculata* at doses 100 and 250 mg/kg for 3 weeks showed a significant reduction in the blood glucose levels, thiobarbituric acid reactive substances, and hydroperoxide in both liver and kidney. This also significantly increased the glutathione, glutathione peroxidase, glutathione S-transferase, and catalase, which is comparable to those of the control group. This study confirms the antidiabetic activity along with potent antioxidant potential in diabetic conditions. It is useful in treating diabetes as per the traditional system.[39]

**Anthelminthic activity:**

Petroleum ether, chloroform, alcohol, and aqueous extracts of leaves of *H. spinosa* in different concentrations (25, 50, 100 mg/mL in 1% Tween 80 in normal saline) were evaluated for anthelminthic activity. Results revealed that the alcoholic extract produced significant anthelminthic activity, whereas chloroform and aqueous extract showed moderate activity and petroleum ether extract was having the least anthelminthic activity.[40]

**Anti-bacterial activity:**

The antibacterial activity of petroleum ether, chloroform, alcohol, and aqueous extracts of leaves of *H. spinosa* were evaluated using disc diffusion method. Concentration of 100 mg/disc showed a significant increase in the diameters of the zone of inhibition (mm) for *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis* and *Pseudomonas aeruginosa* in petri dishes. This finding confirms its traditional use in bacterial infection.[40]

**Analgesic activity:**

Analgesic activity of *H. spinosa* leaves was studied using hot plate and tail flick by thermal method and acetic acid-induced writhing test in chemical method in mice. The petroleum ether, chloroform, alcohol, and aqueous extracts of leaves at a dose of 200 and 400 mg/kg of b.w. significantly increased the pain threshold of mice toward the thermal source in a dose dependent manner and also inhibited the abdominal constriction produced by acetic acid. This reveals its analgesic activity by central as well as peripheral mechanisms.[41]

**Anti-motility:**

The petroleum ether, chloroform, alcohol, and aqueous leaf extracts of *H. spinosa* at a dose of 200 and 400 mg/kg showed a dose dependent decrease in the distance traveled by charcoal meal through the gastrointestinal tract. This supports its traditional role in the treatment of diarrhea and dysentery. [41]

**Antioxidant activity:**

Lobo et al evaluated the antioxidant and free radical scavenging activity of *Hygrophila schulli* ethanolic extract through determination of reducing power, super oxide anion scavenging activity, nitric oxide radical scavenging activity, DPPH radical scavenging activity, ABTS radical scavenging assay, FRAP assay, total antioxidant capacity. On the basis of the results obtained in the present study, it is concluded that a ethanolic extract of *Hygrophila schulli* seed exhibits high antioxidant and free radical scavenging activities.[42]

**Hepatoprotective activity:**

Hepatoprotective effect of aqueous extract of *H. spinosa* root in carbon tetrachloride-induced liver damage was studied in albino rats by Usha et al to support the traditional claim. The aqueous extracts were administered for 15 days. The serum marker enzymes aspartate transaminase, alanine transaminase, and γglutamyl were measured in experimental animals. The increased enzyme levels after liver damage with carbon tetrachloride were nearing normal value when treated with aqueous extract of the root samples. Histopathologic observation was also supportive to the hepatoprotective activity of the root samples. Hepatoprotective activity of *H. spinosa* stem is also reported.[43]

In another study, the antihepatotoxic effect with treatment of methanolic extract of the seeds of the plant was studied on rat liver damage induced by a single dose of paracetamol (3 g/kg, p.o.) or thioacetamide (100 mg/kg, s.c.) by monitoring several liver function tests (namely, serum transaminase, alkaline phosphatase, sorbitol dehydrogenase, glutamate dehydrogenase, and

bilirubin) in the serum. A significant hepatoprotective activity of the methanolic extract of the seeds was observed. These studies support its traditional role as being hepatoprotective. [44]

**Hematopoietic activity:**

Hematopoietic activity of *H. spinosa* was evaluated by Pawar et.al, by using cyclophosphamide induced anemia in rats. Chloroform extract of the leaves at both 250 and 500 mg/kg doses significantly improved RBC and hemoglobin counts for 7 days and cyclophosphamide induced bone marrow suppression after 21 days of treatment. It was also found that bone marrow cellularity was increased.[45]

**Diuretic activity:**

In an experimental study the diuretic activity of different fraction of *Hygrophila auriculata* was performed in male Wistar albino rats in comparison to frusemide Alcoholic extract and n-butanol fraction showed significantly good diuretic action and electrolytic excretion of Na+ and K+ without significant renal excretion of Cl – as compared to frusemide. The observed Na+/K+ ratio for frusemide, alcoholic extract and nbutanol fraction were 1.42, 1.55 and 1.37, respectively, as compared to 1.74 for control. The diuretic actions of other fractions like petroleum ether, chloroform and ethylacetate were not significant.[46]

**Study on polyherbal formulation:**

A polyherbal formulation (trade name Speman) contains *Asteracantha longifolia* (seed), *Orchis mascula* (root), *Lactuca scariola* (seed) and *Mucuna pruriens* (seed). Mitra and co-workers evaluated the efficacy of this formulation on sexual performance and hormone levels in alcohol exposed and normal rats through mounting index, total sexual behaviour, sperm count, serum testosterone levels, histological sections of anterior pituitary gland and testes. They concluded that Speman can reverse the effects of alcohol in alcohol induced hypogonadism and reverse the hypersecretion of ACTH in rats.[47]

Clinical Study: Agrawal and Kulkarni recruited thirty male patients of oligospermia with infertility in the age group of 20-43 years in an open clinical study on Speman. Sperm morphology (evaluated according to Kuruger's criteria after Diff-Quik Staining), serum testosterone and complete seminal examination were carried out before and after the completion of treatment. The patients were administered Speman uncoated tablets at a dose of 2 tablets twice daily for the period of 6 months and were advised for follow-up every month. The results showed that this drug was effective in oligospermia, as it increases the sperm count and improves morphology.[48]

## CONCLUSION:

*Asteracantha longifolia* has been investigated for many phytochemical and pharmacological activities which shows the immense potential of this plant in the treatment of conditions, such as sexual debility, diarrhoea; inflammatory ailments, including liver and kidney disorders, as well as microbial and bacterial infections etc. Regarding the plant, the studies indicate that it has an important antioxidant activity due to the presence of water-soluble compounds with potent free radical-scavenging effects, such as flavonoids, terpenoids, alkaloids, steroids, tannins that may be associated with the lower incidence and lower mortality rates of degenerative diseases in human. These studies prove potential usage of the plant in traditional systems of medicine since long ago. However further clinical trials are needed.

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