

“Nature’s Bronchodilator: A Review on the Therapeutic and Phytochemical Aspects of *Tylophora indica*”

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ABSTRACT:

Shwasaroga, often known as asthma, is a respiratory system ailment that is a *PranavahaSrotodushti Vikara*. It is a chronic condition that has a substantial impact on patients' quality of life. In contemporary medicine, *Shwasaroga* can be linked to bronchial asthma based on its signs and symptoms. *Tamaka Shwasais* the most common kind of *Shwasaroga* and is categorized as a *Vata-KaphajaVyadhi*(illness induced by the vitiation of Vata and *Kapha doshas*). In *Ayurvedic* literature, *Tylophoraasthmatica* (*syn. Tylophora indica*), also referred to as *Antamoola* or *Arkaparni*, *mularasna* is a well-known *Shwasahara* (anti-asthmatic) plant). With its *Vamanakaraka Prabhava* (emetic quality), the plant is especially good at driving out the *Kapha dosha*, which relieves *Tamaka Shwasa*. This review highlights its botanical features, phytochemistry, and therapeutic applications in respiratory disorders.

Keywords: Tylophora, Morphology, *Arkapatri*, *Antamoola*, Anti-asthmatic.

I. Introduction

Asthma, a chronic respiratory disorder, is characterized by wheezing, breathlessness, and labored breathing. In *Ayurveda*, it is described as *Tamaka Roga*, a *PranavahaSrotodushtiVikara* (disorder of the respiratory channels). The term “*Shwasitianenaiti Shwasa*”¹ signifies the act of breathing, while pathologically, *Tamaka shwasaRoga*² refers to rapid or obstructed breathing due to vitiation of Prana Vayu and obstruction by *Kapha dosha*. Acharya Sushruta classifies it as a *Mahavyadhi*, often triggered by dust (*Raja*), smoke (*Dhuma*), cold exposure, excessive exertion, or intake of cold water, which aggravate *Vata* and *Kapha*³ which closely relates with bronchial asthma in modern medicine. Plant-based medicines have long been central to traditional medicine systems for managing respiratory disorders. Among these, *Tylophora indica* (*Antamul*) is a prominent plant for managing *Tamaka Shwasa*. It possesses

Vamakara (emetic), *Shwasahara* (respiratory-relieving), and *Kapha-nihsaraka* (expectorant) properties, making it effective in *Tamaka Shwasa*, which closely correlates with bronchial asthma in modern terms.

Morphology

T.indica has similar appearance to the leaves of *arkaso* it is called *Arkapatri*⁴. It is a slender, perennial climber with semi-shrubby, long, twinning stems and long, fleshy, knotted roots. The leaf measures 2.5 to 6 cm in width and 6 to 10 cm in length. Petioles are 7 to 13 mm long, ovate or elliptic, oblong, acute or acuminate, glabrous, and somewhat hairy, especially when young. The corolla is greenish yellow or greenish purple in color, and the flowers are tiny (1-1.5 cm across). Fruit (follicle) is 5 to 10 cm long, pointed towards the apex.



Fig.a) *T.indica* morphology



Fig.b) *T.indica* climber



Fig.c) *Tylophora indica* Root

Distribution

The genus *Tylophora* comprises around 60 species distributed in tropical and subtropical regions of Asia, Africa, and Australia, with about 35 species reported from China. In India, commonly found species include *Tylophora indica* (syn. *Tylophoraasthmatica*), *T. rotundifolia*, *T. fasciculata*, *T. apiculata*, *T. anomala*, and *T. sylvatica*. Other recognized species are *T. pauciflora*, *T. heterophylla*, *T. secamonoides*, *T. tanakae*, *T. villosa*, and *T. yunnanensis*.⁵

Chemical Constituents

Tylophorine, tylophorinine, and are two therapeutically significant alkaloids found in the plant's leaves and roots. Tylophorindine, desmethyltylophorine, desmethyltylophorinine, desmethyltylophoridine, and anhydrous dehydrotylophorinine. Among

these, alkaloid tylophorine is recognized as the major constituent and is primarily responsible for the plant's strong anti-inflammatory activity. The active constituents of *Tylophora indica* are mainly phenanthroindolizidine alkaloids. In addition to the common alkaloids, several rare alkaloids have been identified, including tyloindicines A, B, C, D, E, F,

G, H, I, and J, desmethyltylophorine, desmethyltylophorinine, isotylocrebrine, anhydrous tylophorinine, anhydrous dehydrotylophorinine, γ -fagarine, skimmianine, 14-hydroxyisotylocrebrine, and 4,6-desmethylisodroxy-O-methyltylophorinindine⁶. These compounds contribute to the plant's pharmacological properties, which include anti-inflammatory, anti-asthmatic, and immunomodulatory effects.

Pharmacological Activities

Anti-allergic action:

Sununda S., Nayampali and Seth U.K authors reported that, By monitoring changes in the perfusate volume per minute, the anti-allergic effect of *T. indica* was combined with that of disodium cromoglycolate on perfused rat lung in sensitized rats. When *T. indica* aqueous extract and disodium cromoglycolate were administered during the perfusion of a sensitized rat lung, the flow rate was greatly raised. *T. indica* may have direct bronchodilator properties as well as immunosuppressive and membrane-stabilizing actions⁷.

Anti-asthmatic action:

The study by Raina V. and Raina S. examines how a brief exposure to tylophorine, an alkaloid found in *Tylophoraasthmatica*, stimulated adenylyl cyclase in human peripheral leukocytes from asthmatic children. Leukocytes from adults or children without asthma did not exhibit limitation of this impact.

Tylophora indica has long been used in *Ayurveda* for treating asthma (Meera et al., 2007). Early clinical use involved administering 400–500 mg of the plant's alkaloid powder once daily for six days (Shivpuri et al., 1968). Traditional dosing typically ranged from 250 mg given 1–3 times daily, standardized to 0.1% alkaloid content, and some practitioners recommended 200–400 mg of dried leaves per day. Clinical studies have also supported the use of a 40 mg/day alcoholic extract for one week⁸.

Hepatoprotective action:

The study by Gujrati Vipul, Patel Nilesh, Rao Vanket N., Nandakumar K., Gauda T.S., Shalam Momd., Kumar S.M. Shanta in albino rats with CCL4-induced hepatotoxicity, the alcoholic extracts of *T. indica* leaves were tested for hepatoprotective efficacy. When compared to rats given CCL4 alone, *T. indica* leaves showed a notable decrease in serum hepatic enzyme [14]. The ability of alcoholic and aqueous extracts of *T. indica*

leaves to prevent ethanol-induced hepatotoxicity. Physical, biochemical, histological, and functional liver characteristics were significantly altered by ethanol. The physical, biochemical, histological, and functional alterations brought on by ethanol in the liver were considerably avoided by pretreatment with ALLT and AQLT extract⁹.

Immuno-modulatory action:

Ganguly et al. (2001) reported that *Tylophora indica* alkaloids can suppress several cellular immune reactions, including contact sensitivity and delayed-type hypersensitivity. To pinpoint how these alkaloids act, they tested them in vitro using Con A-stimulated splenocytes. At higher doses, the alkaloid mixture reduced splenocyte proliferation and lowered IL-2 production, showing that both T cells and macrophages were sensitive to the compounds. Their results indicated a dose-dependent dual effect: -At low levels, the alkaloids increased IL-2 release and boosted Con A-induced lymphocyte growth. At high levels, they inhibited proliferation by decreasing IL-2 and activating macrophages, which exert cytostatic effects¹⁰.

Anti-bacterial action:

Reddy et al. studied the crude methanolic root extracts of *Tylophora indica* and observed antimicrobial activity against *Bacillus subtilis*, *Staphylococcus aureus*, and *Micrococcus luteus*, with zones of inhibition (ZOI) less than 5 mm in diameter. No activity was found against *Escherichia coli* and *Pseudomonas aeruginosa*. In the same study, the extract was found to be effective against *Aspergillus niger* and *Trichoderma viridae*, but not against *Aspergillus fumigatus*¹¹.

Diuretic action:

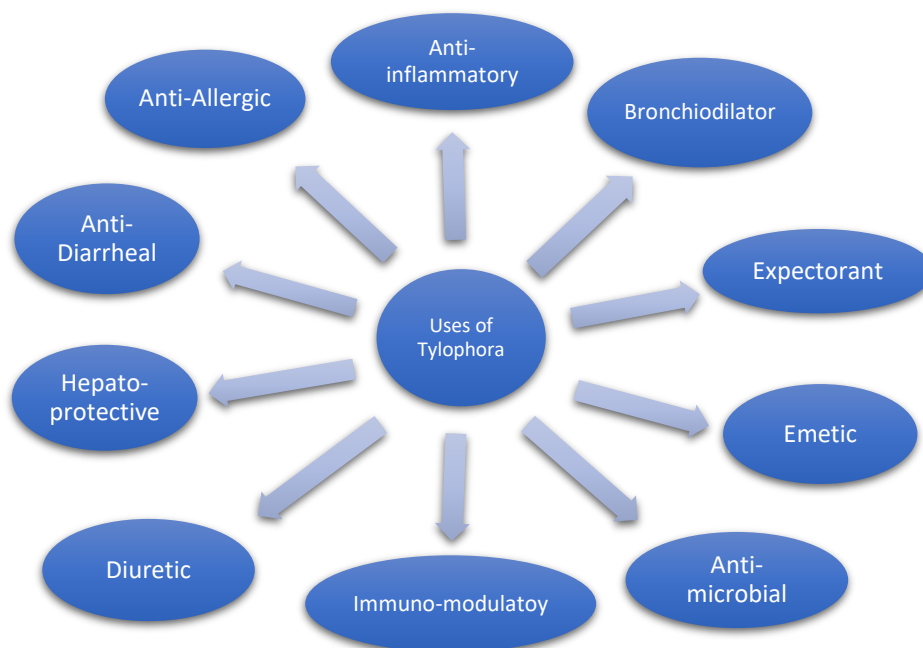
A study conducted by Meera R et.al. Rats were used to examine the diuretic effects of aqueous and alcoholic extracts of *Tylophora indica* leaves. *Tylophora indica* leaf extracts, both alcoholic and aqueous, have strong diuretic properties. According to research, ethanol is the most efficient at raising the urine electrolyte concentration of all the ions—sodium, potassium, and chloride—followed by chloroform and aqueous extracts; other extracts did not significantly raise the urine electrolyte concentration¹².

Anti-inflammatory action:

Tylophora indica's anti-inflammatory effects on carrageenin-induced hind paw oedema and cotton pellet granuloma in albino rats were examined in 2006, along with a comparison with Indomethacin. According to their findings, the plant has an impact on both acute and subacute inflammation (Raj et al., 2006)¹³.

Anti-oxidant Activity:

LPO, CAT, and SOD assay protocols were used in an in vitro investigation to determine the antioxidant usage of the plant using its aqueous and alcoholic leaf extract of *T. indica* leaves. It was discovered that the antioxidant properties of aqueous extract are superior than those of alcoholic extract. According to experimental findings, *T. indica* leaf extract (AQLT) increased superoxide dismutase activity and reduced LPO levels, and it was similar to L-ascorbic acid. Thus, it was noted that *T. indica* leaves have antioxidant capacity and need to be investigated further for potential medical applications (Bhatia et al., 2013)¹⁴.



Conclusion:

Tylophora indica shows promising traditional and scientifically supported therapeutic benefits, especially in asthma and immune modulation, but further research is needed to validate and standardize its medical use.

II. Conclusion

Tylophora indica is a valuable medicinal plant with well-documented traditional use and growing experimental evidence supporting its role in asthma, inflammation, and immune modulation. Despite promising pharmacological data, further clinical trials and standardization studies are required to establish its safety, efficacy, and dosage parameters for integration into evidence-based medical practice.

Conflict of interest: None

Reference

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