



A Review on *Tridax procumbens*, Its Phytochemical Constitution & Anti-Lithiatic Action

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ABSTRACT

T. procumbens known as JAYANTI VEDA in Ayurvedic pharmacopeia is commonly known as Coat Button/Tridax daisy in English or Kansariin Hindi or Ghamara (in local language) and belongs to the family Asteraceae. It has been used in significant number of health issues as mentioned in Ayurvedic classical texts and also in the folklore remedies throughout the Asian subcontinent. It shows various pharmacological actions like anti-microbial, anti-inflammatory, hypotensive, leishmanicidal, lithotriptic, wound healing & repair, hepatoprotective, anti-malarial and immunomodulatory etc. This review paper is an attempt to understand the phytochemical constitution of *Tridaxprocumbens* and its anti-lithiatic action. Kidney stones are a major lifestyle disorder of the present era and there is a wider need and scope for the research of better lithotriptic and anti-lithiatic drug alternatives.

Keywords: *Tridax procumbens*, kidney stones, ayurveda, herbs, herbal, lithiasis etc

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INTRODUCTION

A kidney stone (renal calculus), is a solid congregation or crystallized aggregation that forms in the vulnerable spaces of kidneys by accumulation of various minerals. Multiple factors are attributed to the process of stone formation including heredity, diet, geographical and infective diseases. The recurrence is on the higher side, as much as 50% [1-7].

The commonest kidney stones are the calcium stones, constituting about 80% of the cases. Herbal medications have aroused lot of interest amongst the patients because of its clinically proven effects like immunomodulation, adaptogen and antimutagenic. The excessive usage of synthetic medication results in higher incidence of adverse drug reactions which has motivated humans to return to nature for safe remedies [8-20].

Ayurvedic medical literature has an elaborate description of various types of renal calculi under the concept of VRUKKA ASHMARI. The classification is broadly based on the appearance, nature and the symptoms of the disorder which are majorly influenced by the involvement of the specific dosha viz. Vata, pitta, kapha or their combinations[32-39]. There is also a comprehensive approach towards the management of calculi in Ayurveda in terms of prevention as well as the management of kidney stones with shaman and shodhan therapy [40- 61].

Tridax procumbens belongs to the family Asteraceae or Compositae. It is an annual or perennial shrub and found throughout in Indian subcontinent especially in the states of Maharashtra, Madhya Pradesh, Chhattisgarh as weed. It often seen rooting at the nodes with singular, longitudinally stalked, yellow composite, bisexual flowers that bear white heads and hairy, coarsely serrated, petiolate or lanceolate leaves. The arial part is completely useful in terms of medicinal usage. The leaves are extremely useful in healing of wounds and skin tissue repair, insecticidal activity, antisecretory action and also are anti-hypertensive. Whereas the seeds are useful in arresting haemorrhage [62-65].

The phytochemical screening of *T. procumbens* revealed the presence of alkaloids, saponins, flavonoids (catechins and flavones), fumaric acid, carotenoids and tannins. It is rich in carotenoids, saponins, oleic acid and ions sodium, potassium and calcium. Its flower reported to be rich in Luteolin, gluco-luteolin, quercetin and iso-quercetin. It is known for its number of pharmacological activities. It is primarily antimicrobial, immunomodulator, antidiabetic, anti-inflammatory, hepatoprotective, wound-healing, anti-dysentery, anti-diarrhoea and a hair promoter. Traditionally it is used to control haemorrhagic cuts, and

heal wounds. It is also being used as an insect repellent. The present article studies the lithotriptic effects of JAYANTI (*Tridax procumbens*) as mentioned in the classical literature of Ayurveda [62,63].

Taxonomical Classification [64]

| | | |
|-------------|---|-------------------------|
| Latin name | - | <i>Tridaxprocumbens</i> |
| Kingdom | - | Plantae |
| Subkingdom | - | Tracheobionta |
| Division | - | Spermatophyta |
| Subdivision | - | Magnoliophyta |
| Class | - | Magnoliopsida |
| Subclass | - | Asteridae |
| Order | - | Asterales |
| Family | - | Asteraceae |
| Genus | - | Tridax |
| Species | - | Procumbens |

Botanical Morphology:

Tridaxprocumbens, is a perennial weed, commonly found in the tropics and subtropics. The plant is natively seen in the tropical America, Africa, Asia and Australia. It is a wildy found throughout the Indian subcontinent. It is found abundantly in the meadows, disturbed areas, lawns, croplands, or on the roadside especially in the rainy season [62- 64]

PHYTOCHEMICAL PROPERTIES

The phytochemical evaluation of Tridex screening exhibited the presence of fumaric acid, various alkaloids, flavonoids (catechins and flavones), saponins, Fl-sitosterol, carotenoids, tannins.

Others- carotenoids, saponins, oleanolic acid and ions like sodium, potassium and calcium. Luteolin, quercetin, iso-quercetin and gluco-luteolin, have been extracted from its flowers.

- Moisture content of 88.30 % in the stem, 90.05 % in leaf.
- Protein- 37.44 % dry weight (4.38 % wet weight) in the stem and 34.57 % dry weight (3.44% wet weight) in leaf.
- Total lipid - in the stem is 0.85 % dry weight (0.1 % wet weight) and that in leaf is 6.03 % dry weight (0.6 % wet weight)
- Carbohydrate content- 41.03 % dry weight (4.80 % wet weight) in stem and 51.26 % dry weight (5.10 % wet weight) in the leaf.
- Crude fiber content in stem is 16.41 % dry weight (1.92 % wet weight) and 6.13 % dry weight (0.61 % wet weight) in leaf.
- The metabolizable energy per 100 g of *T. procumbens* is about 321.54 kcal in dry weight (37.62 kcal in wet weight) for stem and 397.59 kcal in dry weight (39.56 kcal in wet weight) for leaf [64].
- The plant of tridax is rich in minerals like Fe (iron), Cu(copper), Mg(manganese), Na(sodium) and Zn(zinc) and also other trace minerals like Mg (magnesium), Ph(phosphorous), K(potassium), Se (selenium) and Ca(calcium) [65].

SOME TRIALS ON TRIDAX PROCUMBENS

Antioxidant Effect

The active principles like flavonoids and alkaloids found in the extracts exhibit antioxidant property [66].

Hepatoprotective Property

In this study lipopolysaccharide and D-galactosamine were used to induce hepatitis in white albino rats. There was significant decrease in enzyme markers such as aspartate transaminase (AST), alanine transaminase (ALT), lactate dehydrogenase, gamma glutamyl transferase and bilirubin in the serum of the animal model by the chloroform extract of aerial parts of *T. procumbens* as evident [67].

Anti-Inflammatory Activity

The extracts of *T. procumbens* (aqueous, ethyl acetate, methanol & ethanol) were found to exhibit significant anti-inflammatory action. The extracts were seen to inhibit the actions of inflammatory mediators like histamine, prostaglandins, bradykinin and serotonin [68]. The flavonoid compound 'Quercetin' displays potent analgesic and anti-inflammatory action[69].

Anti-Arthritic Activity

The ethanolic extract of the *T. procumbens* exhibited a strong role against arthritis in this study. Even in rheumatoid arthritis there was improvement in the swelling and inflammation in the soft tissue around

the joints which was improved by the usage of ethanolic extract of the *T. procumbens*. These studies confirm the anti-arthritic activity of the extract [70].

Immunomodulatory Activity

T. procumbens also enhances the absorption of particulate matter by the phagocytes [71]. The extract was also seen to stimulate a cell-mediated immunological response by raising the leukocyte numbers, number of plasma cells and leukocyte content in the spleen, that increases the phagocytic index [72].

Wound Repair & Healing

The extract derived from the leaves is used in Ayurveda and locally applied on acute wound to arrest bleeding and improve the process of healing. In this particular study the extract exhibited wound healing activity in the studied rats. The plant extract also enhances the mRNA content [73].

Antihypertensive Activity

The leaf extract (aqueous extract) of the *T. procumbens* was seen to lower the mean arterial pressure of blood and reduced heart rate in the rats studied in this particular trial. [74].

Antimicrobial Activity

The extracts of *Tridax procumbens* exhibited anti-microbial potential against both gram+ve and -ve bacterial strains. The active principles such as flavonoids, ethyl esters, tannins, unsaturated fatty acids, saponins, phenols and sterols induce the antimicrobial activity [75].

Anti-Diabetic Activity

The aqueous, ethanolic and methanolic extracts of *T. procumbens* exhibited strong anti-diabetic activity in this particular study. The extracts caused a dip in the alloxan-induced diabetes in the studied rats. The extracts also assisted regeneration of beta cells(pancreas), destroyed by alloxan. Which caused a potential insulin release and stimulation of the utilization of the peripheral glucose [76]. Dihydroxy-oxide is the active ingredient found in the *T. procumbens* extract which is primarily responsible for exhibition of an anti-diabetic effect [77].

Anti-Lithiatic activity

In this particular study there was clear inhibition of CaOx crystal aggregation by *Tridax procumbens*. The inhibitory action of the extract was analysed with changing concentration gradients in the aggregated module of the CaOx crystal. The inhibition percent was found to be in range of 64-152%. A drastic increase in inhibition was observed in the extract concentration of 800µg/mL, 1600µg/mL and 3200µg/mL (113, 127 and 152% respectively) when compared to 50µg/mL, 100µg/mL, 200µg/mL and 400µg/mL (64, 72, 81 and 94% respectively). It was found that in the presence of the plant extracts, overall dimensions of the crystals were decreased. The average size grown in the presence of the inhibitors (extracts) was lesser than of the control sample.

It was therefore found that extracts used in this study caused potential inhibition of the process of nucleation, growth and the aggregation of stone formation [78].

CONCLUSION

Along with other properties, *T. procumbens* exhibits a strong anti urolithiatic effect. The treatment with ethanolic extract of *T. procumbens* was shown to decrease the raised levels of calcium, oxalate and creatinine levels. It also significantly lowered the deposition and accumulation of calcium and oxalates in the renal space. There was a substantially visible reduction in the oxidative stress. On analyzing the renal histology, it was seen that the calcium oxalate crystal reduced in size and number both. The review suggests that *T. procumbens* has potent antiurolithiatic and antioxidant properties [78,79].

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