A COMPREHENSIVE REVIEW OF A HEALING HERB: TRIDAX PROCUMBENS LINN.

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ABSTRACT
Nature has been a source of medicinal agents for thousands of years and an impressive number of medicinal drugs have been isolated from natural resources. It is now a known fact that nature has given cure of every disease in one way or another but the only need is to explore them wisely. So the researchers today are emphasizing on evolution & characterization of various plants & plant constituents against different diseases. The essential uses of many plants have been worked out & published but many useful and valuable plants are still unexplored upto date. One such plant/drug is Tridax procumbens Linn commonly called as coat button in English and Ghamra in Hindi. Though it has been used in folklore practices for hundreds of years but still it is considered a useless weed in many parts of the world. It is a multifaceted weed available throughout the continent which can act as a substitute for many herbs. The present endeavour is an attempt to analyse the updated information of Tridax identification, phytochemical, pharmacogonostic study and its pharmacological activities like hepatoprotective activity, antimicrobial activity, immunomodulating property, defluoridation activity, hypotensive action, anti viral action, anti oxidant action, antiurolithiatic action and anti inflammatory action to serve the ailing mankind by its magical action.

KEYWORDS: Tridax procumbens, Coat button, Ghamra.

INTRODUCTION
India is a country where rich culture, folk medicine & nature go hand in hand. India is blessed with such a wide spread folk medicine called Tridax procumbens Linn commonly known as Ghamra & in English popularly known as coat buttons because of the resemblance of its flowers with coat buttons. This plant of Asteraceae family was introduced in China in 1940. It reflects all the characters of Asteraceae family & shows very much resemblance to one of the member of this family called Eclipta alba or Bhringraj. Its morphological features, anatomical features, part used, action & mode of action resembles very much with Eclipta alba. Though clear description of Tridax procumbens is not given in Samhitas but in various Nighantus it is referred as a species of Bhringraj.

In Shodhal Nighantu two varieties of Bhringraj are described a Pitta Bhringraj (Yellow flowered) & Sveta Bhringraj (white flowered). Yellow types denoted as Avanti & described as Wedalia calendulae & white flowered denoted as Jayanti & described as Tridax procumbens by Acharya Shodhal.

In Madanpal Nighantu three varieties of Bhringraj are defined as Peeta, Neela & Sveta Bhringraj where Sveta bhringaraj is itself called Eclipta alba & Peeta bhringraja is called as Wedelia calendulae & Tridax procumbens Linn.

In Nighantu Adarsha three varieties are described as black, red & white coloured along with description of Pardezi Bhringaraja called as Tridax procumbens.

So, though there is a little controversy in our Nighantu granthas but collectively they have accepted Tridax procumbens as a variety of Eclipta alba, along with the description of many of its useful action or Karma. It is now a known fact that nature has given cure of every disease in one way or another but the only need is to explore them wisely. So the researchers today are emphasizing on evolution & characterization of various plants & plant constituents against different diseases.

Tridax procumbens is a herb present throughout India & is employed as indigenous medicine for variety of ailments. It is found to possess significant medicinal properties against blood pressure, headache, stomach ache, wound healing, diarrhoea, dysentry etc. It also prevents hair fall & its leaves & flowers possess antiseptic, insecticidal & parasiticidal properties. The present review is aimed to notice biological & medicinal activity of Tridax & introducing such unnoticed herb for inclusion in Ayurvedic Medicine to serve the ailing mankind.

Classification
The plant classification details are:
- Kingdom: Plantae
- Sub-Kingdom: Tracheobionta
- Seed Plants
- Division: Magnoliophyta
- Flowering plants
- Class: Magnoliopsida
-Dicotyledons
- Sub class: Asteridae
- Order: Asterales
- Family: Asteracea Aster Family
- Genus: Tridax
- Species: Tridax procumbens (L) coat button.

Properties
Ayurvedic Properties of T. Procumbens are:
- Rasa - Kashaya, Amla, Tikta
- Vata, Pitta, Kapha
- Anvahelo, Kaphayelo
- Ama, Kapha, Vatca, Kachyana, Katia, Vata, Ila, Teja, Raja
- Gandha, Amla, Sava, Tika, Vata, Pitta, Kapha
- Vata, Pitta, Kapha
- Ashwagandha, Amla, Tika, Vata, Pitta, Kapha

Latin Name: Tridax procumbens
Synonym: Tridax procumbens (L), Coat button
Common Name: Coat button, Ghamra
Botanical Name: Tridax procumbens
Part Used: Flower, Whole plant
Place of Origin: North America
Distribution: Widely distributed throughout the southern states of the United States

Description:
- Tridax procumbens is a prostrate, herbaceous plant
- Stems hairless, 10-20 cm long
- Leaves alternate, 2-5 cm long, 1-2 cm wide
- Flowers yellow, in terminal clusters
- Fruits are small capsules

Pharmacological Properties:
- Hepatoprotective activity
- Antioxidant activity
- Anti-inflammatory activity
- Anti-oxidant activity
- Antiurolithiatic action
- Antimicrobial activity
- Immunomodulating property

Useful Actions:
- Used in the treatment of skin infections
- Used in the treatment of diarrhea
- Used in the treatment of constipation
- Used in the treatment of uterine disorders

References:
1. Shodhal Nighantu
2. Madanpal Nighantu
3. Nighantu Adarsha
4. Ayurvedic Pharmacogonostic Study
**Requirements of T. procumbens**

- Whole plant (leaf, stem & flowers) is used to cure different ailments.

**Chemical Constituents**

Flavanoid (procumenetin) isolated from the aerial parts of *Tridax procumbens* has been characterized as 3, 6-‘-dimethoxy-5, 7, 2’, 3’, 4’- pentahydroxy flavone 7-O-β-D-glucopyranoside on the basis of spectroscopic techniques & by chemical means.

Isolation of methyl 14 oxoacageanoate, methyl 14- oxononacanoate, 3-methyl-non adecylenzene, hepatocasynl cyclohexane carboxylate, 1-(2, 2, dimethyl-3-hydroxy propyl)-2- isobutyl phthalate, 12-hydroxytetraecosa-15-one, 32-methyl-30-ozotetraetracont-31-en-1-ol along with β amyln, β amynne, tucosterol & sitosterol, arachidic, behenic, lauric, lineoic, linolenic, myristic, palmitic & stearic acids have been isolated.

It is also a potential source of the protein supplements & pro vitamin A (carotenoid).

**Pharmacological Activity**

1. **Hepatoprotective activity**

   Its hepatoprotective action was seen in d-Galactosamine/Lipopolysaccharide (d-Gal/N/LPS) induced rats. d-Gal N/LPS are hepatotoxic by its action of destroying liver cells. It selectively blocks the transcription & indirectly hepatic protein synthesis causing endotoxin toxicity & leading to fulminant hepatitis within 8 hrs of administration.

   The results revealed that *T. procumbens* could afford a significant protection in the alleviation of d-Gal N/LPS-induced hepatocellular injury.

2. **Immunomodulatory activity**

   Albino rats dosed with *Pseudomonas aeruginosa* when administered with ethaholic extract of leaves of *Tridax* showed stimulation of humoral immune response along with elevation in hemagglutination antibody titer. It also inhibited proliferation of *P. aeruginosa* along with significant increase in phagocytic index, leukocyte count & splenic antibody secreting cells.

3. **Wound healing activity**

   *Tridax* opposed antipetelization & tensile strength depressing effect of dexamethasone (a well known healing suppressant agent) without affecting anticontraction & antigranulation action of dexamethasone. Aqueous extract was also effective in increasing lysyl oxidase, but to a lesser degree than whole plant extract. Further, it has been shown that extract of leaves of *T. procumbens* promotes wound healing in both normal & immunocompromised (steroid treated) rats in dead space wound healing model. The plant increases not only lysyl oxidase but also, protein & nucleic acid content in the granulation tissue, probably as a result of increase in glycosaminoglycan content.

4. **Antidiabetic activity**

   Aqueous & alcoholic extract of leaves of *Tridax*
showed a significant decrease in the blood glucose level in the model of alloxan induced diabetes in rats.\(^{15}\)

5. **Antimicrobial activity**

Whole plant of *Tridax* has reported for its antimicrobial activity on various species of bacteria. Fresh plant juice when applied twice a day for 3-4 days cures cuts & wounds. Whole plant extract when used against 4 strains of bacteria –2 gram positive- *Bacillus subtilis, Staphylococcus aureus* & two Gram negative *Escherichia coli* & *P. aeruginosa* showed anti bacterial activity only against *P. aeruginosa*.\(^{16}\)

*Tridax procumbens* also possess antifungal property against three phytopathogenic fungi i.e. *Helminthosporium oryzae, rhizoclonea solani & pyricularia oryzae*.\(^{17}\)

Methanolic extract of leaves of *T. procumbens* were found to be active against two tested fungi (*A. niger* and *A. ocreaceous*). The fungal strain of *A. niger* and *A. ocreaceous* shows zone of inhibition 13mm and 12mm respectively where positive control (ciprofloxacin) produced zone of inhibition 11mm and 10mm respectively.\(^{18}\)

The n-hexane extract of the flower showed activity against *E. coli*. The same extracts of whole aerial part was active against *Mycobacterium smegmatis, E-coli, Salmonella paratyphi & Staphylococcus aureus* while aqueous extract showed no antimicrobial activity.\(^{19}\)

Among the various karmas defined of *Tridax procumbens*, it’s antimicrobial action, in present era when man is surrounded by countless microorganism & human body has become resistant to many of the strains of bacteria & fungi, has emerged as a new ray of hope.

6. **Defluoridation action**

Fluoride though acts as a protective agent for teeth but when in excess it is harmful to health. Recently, researchers in India have developed a filter system based on medicinal herb, which can quickly & easily remove fluoride from drinking water. *T. procumbens* a medicinal herb in India, previously was examined for its topical repellency effects against *P. procumbens* leaf was tested on anaesthetized *Sprague Dawley* rat. The aqueous extract caused significant dose dependent decrease in mean arterial blood pressure. The higher dose leads to significant reduction in heart rate whereas lower dose did not cause any change in the same. Thus leaves of *T. procumbens* showed hypotensive effects.\(^{26}\)

7. **Anti Viral activity**

The therapeutic potential of *T. procumbens* L. extracts were screened for antiviransomal properties in mice infected with *Trypanosoma brucei* by *Abubakar* et al & found insufficient anti trypanosomal activity, though stated that the modification of the detected phenolic compound may generate effective antitrypanosomal drug.\(^{22}\)

8. **Anti inflammatory activity**

The anti inflammatory action of leaf extract of *Tridax* was assessed on carrageein induced paw edema along with standard drug, Ibuprofen\(^{27}\). The extract increased the inhibition of oedema if treated with standard drug Ibuprofen. Water soluble powder of leaf extract was administered orally at different doses to rats. The result demonstrated that the extract posses analgesic activity. *T. procumbens* dose reduced the abdominal writhing.\(^{23}\) Meshram & Patel investigated that alcholic & hydroalcoholic extracts have anti inflammatory activity using the rat paw oedema assay & showed oedema inhibition 0.82%, 16.80%, 11.39%\(^{24}\).

9. **Antiurolithiatic activity**

Ethanol extract of *Tridax procumbens* L. was used for treating kidney stone disorders. It was evaluated against 0.75% v/v ethylene glycol & 2% v/v ammonium chloride induced calcium oxalate urolithiasis & hyperoxaluria induced oxidative stress in male albino rats. Treatment with the extract was able to reduce caluculogenesis induced urinary excretion & renal deposition of calcium oxalate & resultant lipid peroxidation including its antiurolithiatic & antioxidant effect.

10. **Hypotensive**

Cardiovascular effect of aqueous extract of *T. procumbens* leaf was tested on anaesthetized *Sprague Dawley* rat. The aqueous extract caused significant dose dependent decrease in mean arterial blood pressure. The higher dose leads to significant reduction in heart rate whereas lower dose did not cause any change in the same. Thus leaves of *T. procumbens* showed hypotensive effects.\(^{26}\)

11. **Repellent activity**

In a study, essential oils were extracted by steam distillation from leaves of *T. procumbens* L. & were examined for its topical repellency effects against malaria parasite *Anopheles stephensi* in mosquito cages.\(^{27}\) All essential oils were tested at three diff. concentration (2, 4 & 6 %) of these, the essential oils of *Tridax* exhibited relatively high repellency effect (300 minutes at 6% conc.) & calculated that *Tridax* are promising as repellent at 6 % conc. against *A stephensi*.\(^{28}\)

12. **Anticancerous activity**

The activity of *T. procumbens* flower crude aqueous & acetone extract was tested on prostate epithelial cancerous cell. PC3 was determined by measuring cell viability by MTT assay \(^{29,30}\). Experiment consists of cleavage of the soluble yellow coloured tetrazolium salt MTT [3-4, 5- dimethyl-thiazole-2-yl]-2,5 diphenyl-tetrazolium bromide] to a blue coloured formazan by the mitochondrial succinate dehydrogenase. The assay was based on the capacity of mitochondrial enzymes of viable cells to reduce the yellow soluble salt MTT to purple blue insoluble formazan precipitate which is then
13. Antioxidant property

Antioxidant prevents the damage done to cells due to free radical molecules released during normal metabolic process. The results of DPPH radical scavenging activity of Tridax against test sample and standard (gallic & ascorbic acids (Fluka) shows that Tridax possess very high percentage antioxidant activity, 96.70% at a concentrator of 250 µg/ml. It shows a reductive potential of 0.89 mm. Tridax extracts may have hydrogen donors thus scavenging the free radical DPPH with High AA% of 96.70% at 250 µg/ml which was observed to be higher than those of standards (ascorbic & gallic acids) at a conc. of 250 µg/ml used. Thus Tridax plants are rich source of natural antioxidant.(33)

14. Anti arthritic

Tridax at 250 & 500 mg/kg has displayed significant anti arthritic activity comparable to that of indomethacin. The ethanolic whole plant extract of Tridax exerts an anti arthritic activity by significantly altering the pathogenesis during FCA induced arthritis in female SD rats without exerting any side effect. (34)

Tridax ethanolic extract showed better results than ethyl acetate extract at 300 mg/ kg comparatively, as Tridax ethanolic extract showed significant results (P<0.001-0.05) whereas Tridax ethyl acetate extract was less significant (P<0.05) comparing with various groups by one way ANOVA followed by Turkey's multiple comparison test. Rheumatoid factor was found negative in animals of all groups of rat adjuvant poly arthritis. The migration of leucocytes into the inflammed area is significantly supressed by Tridax ethanolic extract when compared to standard drug (Diclofenac sodium, cyclophosphamide) as seen from the significant reduction in total WBC count.(35) Earlier findings suggests that absorption of 14-C Glucose & 14-C leucine in rat's intestine was reduced in case of inflamed rats.

Folk Practice

Though we don’t get a description of T. procumbens in our Samhita Granthas and even Nighantas have described it suspiciously but still its medicinal uses are being practiced by folklore for the past ages. Some of them are as follows.

1. In village side it has been used as a medicine to stop hemorrhage from cuts and bruises as anticogulant. (36)
2. It is used as an ornament or fodder plant & its leaves are also cooked as vegetables (37,38)
3. In Nigeria (39) Tridax is traditionally used in the treatment of fever, typhoid fever, cough, asthma, epilepsy & diarrhoea. (40)
4. In west African sub region & tropical zone of the world, traditional medical practitioners & native people of these area uses its leaves as a remedy against conjunctivitis. (41)
5. The plant was also used as a good bioadsorbent for the removal of highly toxic ions of Cr (VI) from industrial waste water. Hence Tridax procumbens quantified spectro photometrically at 570 nm. (31,32)

CONCLUSION

Thus T. procumbens is a plant with its all parts having noble pharmacological activities. Especially antimicrobial action of T. procumbens are quiet significant in the present era continued increase in antibiotic resistance has fuelled the need for development of new antibiotics. Hence the last decade witnessed an increase in the investigations on plants as a source of human disease management and more natural antibacterial and anti fungi have driven scientists to investigate the effectiveness of inhibitory compounds such as extracts of plants. These investigations have opened up the possibility of the use of this plant in drug development for humans and highlights necessity for further studies to evaluate the use of T.procumbens as safe alternative.

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