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Review Article

Tridax procumbens pharmacological activities - An updated review

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Abstract

Tridax procumbens is also known as coat buttons belongs to family Asteraceace. It is the important medicinal plant which is mainly found in central and South America. It is also seen in tropical, subtropical and mild temperate regions worldwide. It is a flowering plant and widespread weed that contains several medicinal values. The whole plant extract is used as drug. *Tridax procumbens* has been described to use as antidiabetic, antioxidant, hepatoprotective, wound healing. It is also used in the treatment of infectious skin diseases, liver disorders and kidney stone diseases. The major active constituents of this plant are flavanoids, alkaloids, saponins, tannins, terpenes, kaempferol and isoquercetin. Traditionally it has been used for treating blisters, ulcer, jaundice, respiratory problems and gastritis.

Introduction

Tridax procumbens is also called as coat buttons [1] belongs to family Asteraceae. It is mainly found in central and South America [2]. It is also seen in tropical, subtropical and mild temperate regions worldwide [1]. It is a small, semi prostate, annual or perennial and herbaceous creeper weed having short, hairy blade-like leaves. Corolla is yellow coloured. The stem is elongated to the height of 20-60 cm tall, branched, sparsely hairy, rooting at nodes. Leaves are simple, opposite, stipulate, lanceolate or ovate. 4-8 cm long, toothed margin, base wedge-shaped, shortly and petiole, hairy on both surfaces. Flowers are tubular, yellow with hairs, inflorescence capitulum. The plant has two types flower, ray florets and disc florets [2]. It has many pharmacological activities like wound healing, anticoagulant, antifungal, antioxidant, antimicrobial, antiparasitic, anticancer, hepato-protective, immunomodulatory, antidiabetic, anti-inflammatory, antihypertensive, antiprotozoal activity [1-3]. This plant is enriched with various constituents such luteolin, glucotureolin, β-sitosterol, flavone, dexamethasone, glycoside and quercetin [2].

Taxonomical classification

Tab No 1.1: Taxonomical classification

Kingdom	Plantae
subkingdom	Tracheobionta
Division	Magnoliophyte
Class	Magnoliopsida
Subclass	Asteridae
Clade	Angiosprems
Order	Asterales
Family	Asteraceae
Tribe	Heliantheae
Genus	Tridax
Species	T. procumbens

Habitat

Tridax procumbens is an annual or perennial herbaceous weed found in tropical and subtropical areas of the world, growing mainly during the rainy season at meadows, croplands, disturbed areas, and lawns, roadside or settled areas. This medicinal herb shows a typical feature of a beneficial weed [2-5].

Botanical Morphology

Fig 1.1 Whole plant

Fig 1.2 Leaves

Leaves

Leaves are 1 to 2 cm long, opposite, simple, with a petiole. They are soft, thick and dark green. The lamina is oval to lanceolate, 2 to 6 cm long and 2 to 4 cm wide, base attenuate in the corner and with strongly and irregularly serrated margin. Both sides are hispid, with tuberculate based bristles. Pubescence is most abundant on the underside.

Fig 1.3 Infloroscence

Inflorescence

Inflorescences in solitary capitulum, held by a peduncle, 12 to 32 cm long, abundantly hispid. The bracts of the involucre are arranged in 2 rows. They are oval to lanceolate; 6 mm long, pubescent and green.

Fig 1.4 Flower

Flower

Capitulum formed of 3 to 8 ligulate daisy like female flowers, creamy white on the periphery of capitulum, tridentate in the center of capitulum, flowers are yellow, tubulate bisexual. The tube, 6 mm long, with five short tines at the top. This plant has two types of the flower as ray florets and disc florets with basal placentation.

Phytochemical Constituents

Tridax procumbens contains a number of phytochemical constituents:

Leaves

Flavanoids, kaempferol, (-)-epicatechin, isoquercetin, glucoluteolin, tannins, condensed catechic, alkaloids, akuammibe, vaucangine, terpenes, α and β pinenes.

Pedicle and buds: alkaloids.

Dried leaves

Flavanoids, saponins.

Flowers

Saponin B- sitostrol-3-o-β-d-xylopyranoside, flavanoids, kaempferol, (-)-epicatechin, isoquercetin and glucoluteolin.

Stem and root

flavanoids, kaempferol, (-)-epicatechin, isoquercetin, glucoluteoli [6-19].

Harmacological Activity

Tridax procumbens shown to have varied pharmacological activities such as antioxidant, hepatoprotective, immunomodulatory, wound healing, antimicrobial, antidiabetic, antiobesity, anti-inflammatory, anticancer, antiprotozoal, antidiarrhoeal, antihypertensive, antifungal and antimalarial as follows.

Antidiabetic Activity

Sonawane et.al evaluated invitro antidiabetic activity of petroleum ether, chloroform, and methanol extracts of the whole plant of *Tridax procumbens against* α-amylase enzyme. Among all the extract methanolic extract exhibited significant inhibiting *of* α-amylase enzyme with an IC50 value of >10 µg/ml [20].

ANTICANCER ACTIVITY

Cancer is a multifactorial disease. Recently the anticancer activity of *T. procumbens* has been researched. Prostate epithelial cancerous cells (PC3) was tested by crude flower aqueous and acetone extract. In aqueous extract shows very weak anticancer activity but acetone extract have 82.28% activity against cancer cells within 24 hours of treatment. There is an inhibition of new blood vessels in lungs because of tumor nodule formation. Apoptosis can be induced by oils of the plant *T. procumbens* [21].

Antioxidant Activity

The free radical scavenging activity of *Tridax procumbens* fractions and ascorbic acid was measured in terms of hydrogen donating or radicals scavenging ability using stable radical DPPH. 0.1 mm solution DPPH in methanol was prepared and 1.0 ml of the solution was added to 3.0 ml of extract solution in water at different concentrations. Thirty minutes later, the absorbent was measured at 570 nm. Lower absorbents of the reaction mixtures indicates higher free radical scavenging activity [22-25].

Antimicrobial Activity

In this study, the antibacterial activity of petroleum, ether and ethanolic extracts of leaves of *T. Procumbens* against *bacillus faecalis* has been reported. Antibacterial activity of chloroform extract was also reported against *B. faecalis, B. subtilis, E. coli, and Pseudomonas aeruginosa* [27].

Hepatoprotective Activity

The hepatoprotective activity of *T. procumbens* was investigated against d-Galactosamine/lipopolysaccharide (d-GalN/LPS) induced hepatits in rats. D-GalN/LPS have the ability to destruct liver cells. The lesion of viral hepatitis in humans and multifocal necrosis produced by d-GalN are similar [28].

Immunomodulatory Activity

Immunomodulatory effect of ethanol insoluble fraction of aqueous extract has been evaluated on albino rats dosed with *Pseudomonas aeruginosa*. As per the results, increased phagocytic index, leukocyte count and spleenic antibodies secreting cells was observed in extract treated rats [29-30].

Wound Healing Activity

The activity was reported on albino rats by the extracts of whole plant extract, aqueous extract, butanol fraction, petroleum ether fraction [31].

Anti Inflammatory Activity

T. procumbens shown to have significant anti-inflammatory activity. The activity is because of the plant decoction due to corticotropic influence. The main fraction is ethyl acetate fraction and contain moderate polar natural compounds like: alkaloids and flavonoids. These bioactive fractions have reactive against pathogenesis of inflammation and related ailments [32-33].

Anti Diarrhoeal Activity

The activity were performed on Castrol oil induced diarrhoea albino rats by the extracts of petroleum ether, dichloromethane and ethanol at the dose of 200 mg/kg and 400mg/kg [34].

Anti Malarial Activity

There is an anti-plasmodia properties against chloroquine-resistant *Plasmodium falciparum* by water and ethanol decoctions and it also shows low toxicities to human RBCs [35].

Tab no 1.2: Pharmacological properties of *Tridax procumbens*

Sl No	Pharamcological Activity	Extract	Citation
1.	Antimicrobial activity	Petroleum, ether and ethanolic extracts from leaves, essences	27,36,37
2.	Antidiabetic activity	Ethanolic extract of whole plants, pet. Ether, methanol, chloroform extracts	20,38
3.	Anticancer activity	crude flower aqueous and acetone extract, essential oils extract	10,27,39
4.	Hepatoprotective activity	Flowers, leaves and aerial parts. Chloroform in soluble fraction of an ethanol extract, petroleum ether, methanol and chloroform water extract	40,41,42
4.	Antihypertensive activity	Ethyl acetate and dichlorometha ne fraction from the	43

		aerial part of the plant	
5.	Antioxidant activity	Ethyl acetate and n-butanol fractions obtained from methanolic extracts, essential oils	44,45,46, 47
6.	Immunoenhancement activity	Ethanol insoluble fraction of aqueous extract	48
7.	Anti-parasitic activity	Bioassay guided fractionation with a methanol extract	49
8.	Anti-bacterial activity	N-hexane extracts, ethyl acetate extract, chloroform extract, essential oil extract	50,51
9.	Antifungal activity	Aerial parts-pedicle and buds	10,38,52
10.	Antimalarial activity	Water and ethanol decoctions	53

Traditional Uses

Tridax procumbens is a flowering plant and widespread weed that contains several medicinal values[54] .Traditionally, in India it has been used as antimicrobial, wound healing agent, insect repellent, immunomodulating and anticoagulant activity. Commonly it can be used to treat:

- Blisters
- Cure boils
- Ulcer
- Gastritis
- Heart burn
- Cuts
- Bruise
- Wounds
- Reduce high blood pressure and blood glucose level
- Dysentery and severe diarrhoea
- Respiratory treatment
- Jaundice [55-58]

It can also be used as hair tonics to prevent hair failing and to promote hair growth. The leave decoctions of *Tridax procumbens* where used to treat infectious skin diseases in ethnomedicines. The hepatoprotective nature of the plant decoction are widely used to treat liver disorders[59-61]. Ethanol decoction of the plant where also used for curing kidney stone diseases [62].

Conclusion

This article emphases on the phytochemical profile and pharmacological activities of *Tridax procumbens*. The phytoconstituents present in this plant might be responsible for varied pharmacological activities. This review facilitate the researcher to explore and identify further activities and specific constituents responsible for its activity.

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