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A comprehensive review on phytochemistry and pharmacological use of *Tridax procumbens* Linn.

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Abstract
The medicinal plants are the rich sources of natural remedies to treat the pathogenic and other diseases. Plant *Tridax procumbens* belongs to family Asteraceae one off. Plant is native of tropical America and naturalized in tropical Africa, Asia, and Australia. Local people known it as "Ghamara", in English popularly called 'coat buttons' and is dispensed for "Bhringraj" by some of the practitioners of Ayurveda. The phytochemical screening revealed the presence of alkaloids, carotenoids, flavonoids (catechin and flavones), fumeric acid, fl-sitosterol, saponins and tannins. It is richly endowed with carotenoids, saponins, oleanolic acid and ions like calcium, magnesium, potassium, sodium and selenium. Luteolin, glucoluteolin, quercetin and isoquercetin have been reported from its flowers. *Tridax procumbens* pharmacologically well known for its antiviral, antioxidant, hepatoprotective antibiotic efficacies, wound healing, insecticidal, wound healing, antidiabetic activity, hypotensive effect, immunomodulating property, bronchial catarrh, dysentery, diarrhoea and to prevent falling of hair promotes the growth of hair, and antimicrobial activity against both gram-positive and gram-negative bacteria, anti-cancer, anti-inflammatory activity and antitubercular. This review is attempts to present phytochemical & pharmacologically use, significance of *Tridax procumbens* for development of new lead molecule to cure the acute & chronic diseases.

Keywords: *Tridax procumbens* phytochemical, pharmacologically active

Introduction
Tridax procumbens commonly known as coat buttons [1] or Tridax daisy is a species of flowering plant in the daisy family. It is best known as a widespread weed and pest plant. It is native to the tropical Americas, but it has been introduced to tropical, subtropical, and mild temperate regions worldwide. It is listed as a noxious weed. This weed can be found in fields, meadows, croplands, disturbed areas, lawns, and roadsides in areas with tropical or semi-tropical climates. Traditionally *Tridax procumbens* has been in use in India for wound healing and as an anticoagulant, antifungal, and insect repellent. The juice extracted from the leaves is directly applied on wounds. Its leaf extracts were used for infectious skin diseases in folk medicines. It is used in Ayurvedic medicine for liver disorders, hepatoprotection, gastritis, and heartburn [2-3] *Tridax procumbens* is also used as treatment for boils, blisters, and cuts by local healers in parts of India [4].

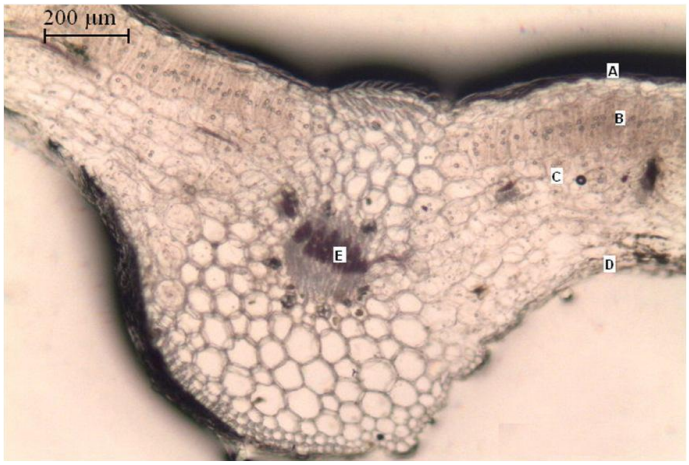
Classification [5]:

Taxonomic Classification	
Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Clade	Angiosperms
Order	Asterales
Clade	Eudicots
Family	Asteraceae
Tribe	Heliantheae
Genus	Tridax
Species	*T. procumbens*
Binomial name	*Tridax procumbens*

Fig 1: *Tridax procumbens* Linn.

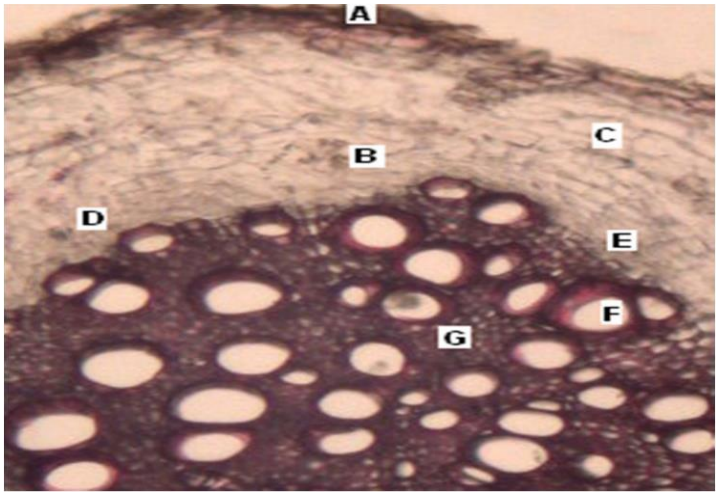
Tridax procumbens is a semi-prostrate annual or short-lived perennial, perennial, *prostrate to ascending herb* with stems up to 50 cm long. The plant bears daisy like yellow-centered white or yellow flowers with three-toothed ray florets. Flowering throughout the year. Capitula 1-1.5 cm in diameter, rays 4 mm. Leaves simple, toothed and generally arrowhead-shaped, entire, rarely pinnatisect. Peduncle very long, strigose. Leaf Shape is lanceolate-ovate having acute leaf apex, acute leaf base and coarsely serrate leaf margins. Leaves petiole up to c.2 cm; lamina ovate, strigose-pubescent on both sides; margin coarsely and often deeply dentate. Its fruit is a hard turbinate achene, smooth or faintly ribbed covered with stiff hairs and having a feathery, plume like white pappus at one end. Fruit with pale ascending hairs, giving achene grayish-brown appearance. Fruiting throughout the year. Fruit is narrowly obconic to cylindrical, tapering to a blunt base, 1.5-2.5 mm long, 0.5-1.4 mm in diameter [6-7].

Histological studies of *Tridax procumbens* [8].



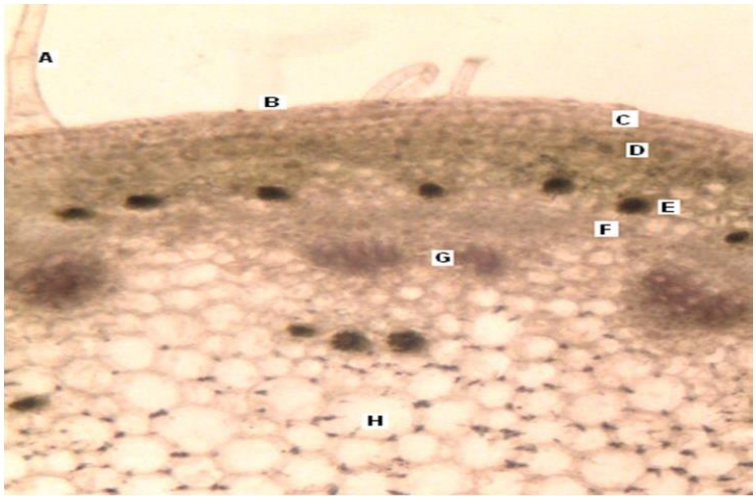
A: Upper epidermis, **B:** palisade cells, **C:** mesophyll, **D:** lower epidermis, **E:** vascular bundles

Fig 1: TS of Leaf of *Tridax procumbens* X40



A: exodermis, **B & C:** phelloderm, **D:** pericycle, **E:** phloem, **F:** xylem, **G:** medullary rays

Fig 2: TS of Root of *Tridax procumbens* X40



A: covering trichome, **B:** cuticle, **C:** epidermis, **D:** cortex, **E:** primary phloem, **F:** cambium, **G:** primary xylem, **H:** pith

Fig 3: TS of Stem of *Tridax procumbens* X40

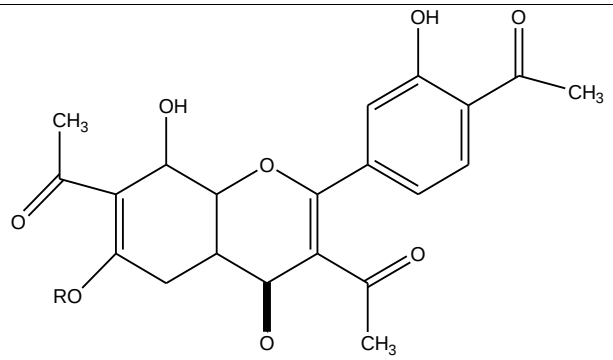
Chemical Profile of *Tridax procumbens* Linn [9].

The proximate, mineral and phytochemical composition of T. procumbens was investigated. The proximate profile included moisture (90.05±0.00%), crude protein (3.44±0.00% WW and 34.57±0.00% DW), crude fat (0.60±0.02% WW and 6.03±0.20%), total carbohydrate (5.10±0.02% WW and 51.26±0.20% DW), crude fibre (0.61±0.04% WW and 6.13±0.40% DW), total metabolizable energy value (39.56±0.26kcal/100 g WW and 397.59±2.61kcal/100 g DW) and a total ash content of 0.20±0.02% WW and 2.01±0.20% DW, which is rich in sodium (5.02 mg/100 g WW and 50.44 mg/100 g DW), potassium (3.18 mg/100 g WW and 31.92 mg/100 g DW) and calcium (2.09 mg/100 g WW and 20.96 mg/100 g DW). The phytochemical screening revealed the presence of alkaloids, carotenoids, flavonoids (catechins and flavones), saponins and tannins. It is richly endowed with carotenoids (9.41 mg/100 g WW and 94.57 mg/100 g DW) and saponins (10.30mg/100g WW and 103.52mg/100g DW). This result suggests the likelihood of this plant serving as a potential source of protein supplements and pro vitamin A (carotenoids) to the population. It also indicates that dehydration can improve the nutritional quality of Tridax procumbens.

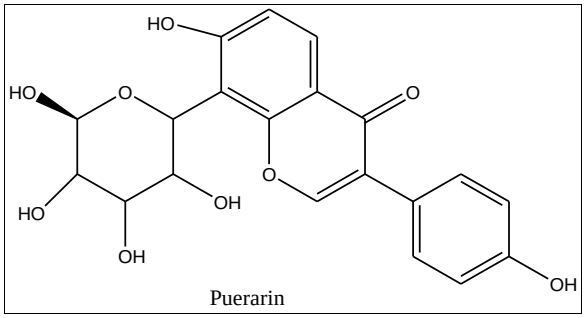
Chemical constituents

A number active chemical constituent were isolated & reported from the plant *Tridax procumbens.* As a alkaloids, flavonoids, carotenoids, β-sitosterol, fumeric acid, Luteolin, quercetin, oxoester, lauric acid, myristic, palmitic, arachidic, linoleic acid and tannin etc [10-11]. Earlier researchers reported presence of dexamethasone, Luteolin, glucoluteolin, beta-sitosterol and quercetin [12]. Linolenic acid was also reported in the aerial parts. Two water soluble polysaccharide; WSTP-IA and WSTP-IB containing β-(1->6)-DGalactan main chain has also been purified from the leaves of the plant [13]. Identification of some sterols by GC-MS and lipid constituents of *Tridax procumbens* was also reported. A new flavonoid "Procumbenetin" isolated from aerial parts of plant has been characterized as 3, 6- dimethoxy-5, 7, 2', 3', 4'-pentahydroxyflavone 7- O-β-glucopyranoside[11].Mineral composition of *T. procumbens* reported from leaves is calcium, magnesium, potassium, sodium and selenium. It has been observed that *T. procumbens* can serve as a good source of plant protein and potassium supplement, as well as being potential source of provitamin A (carotenoids) to the population [14-15]. Four new terpenoids along with bis-bithiophene were reported from *T. procumbens*: Taraxasteryl acetate, beta-amyrenone, lupeol and oleanolic acid[16].Two new flavones, 8,3′-dihydroxy- 3,7,4′-trimethoxy-6-*O-β*-D-glucopyranosyl flavone and 6,8,3′-trihydroxy-3,7,4′-trimethoxyflavone were isolated from *Tridax procumbens* Linn., four known compounds puerarin. Esculetin, oleanolic acid and betulinic acid [17].

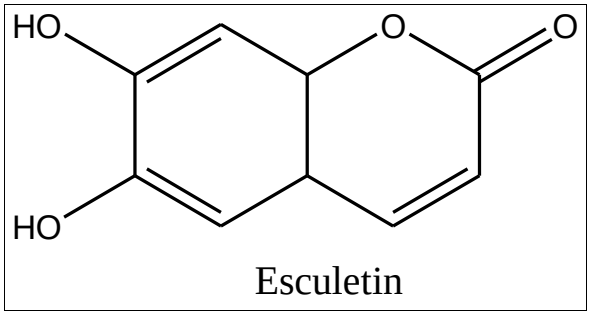
Reported structure of isolated compounds.



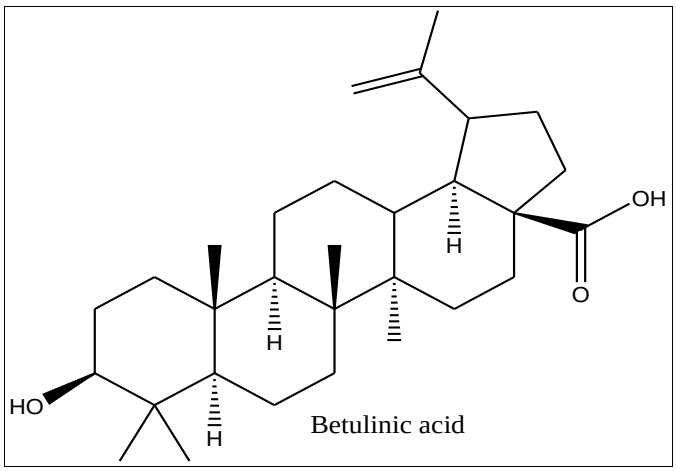
1- R=Glu, 2-R=H
1 .8, 3 b-dihydroxy-3, 7, 4 b-trimethoxy-6-O-b-D-glucopyranosyl flavone
2. 6,8,3 b-trihydroxy-3,7,4 b-trimethoxyflavone



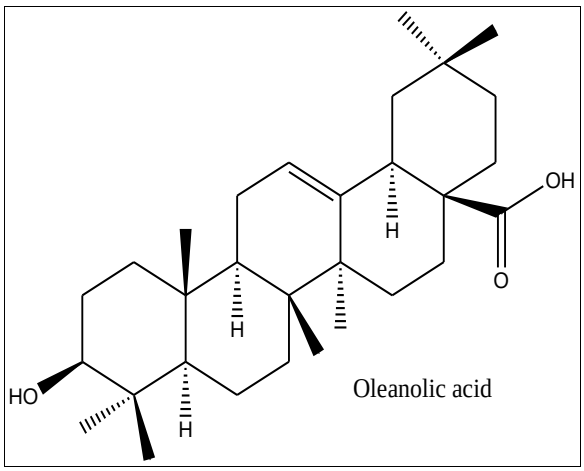
Puerarin



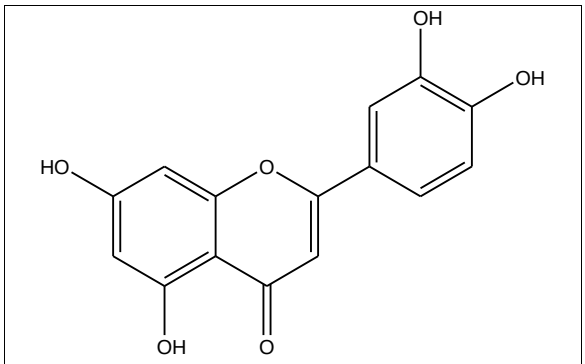
Esculetin



Betulinic acid

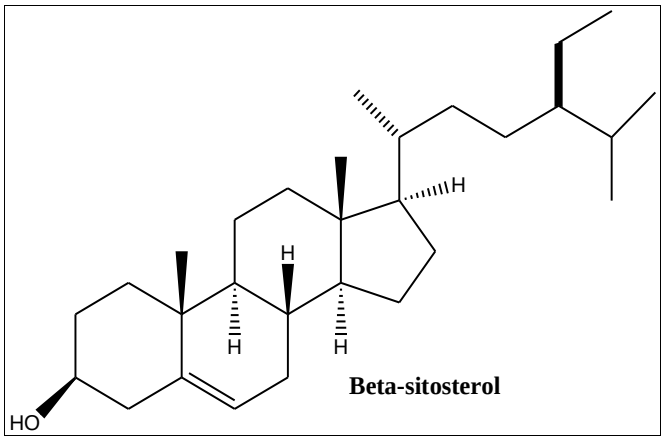


Oleanolic acid

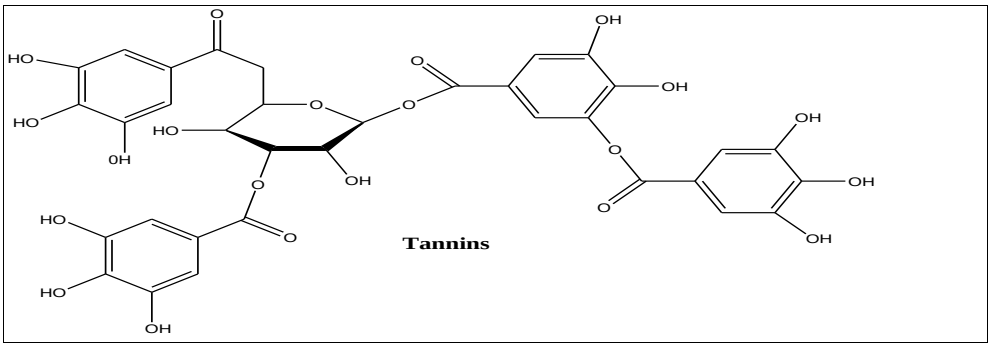


5,7-dihydroxy-2-(3,4-dihydroxyphenyl)-4*H*-chromen-4-one

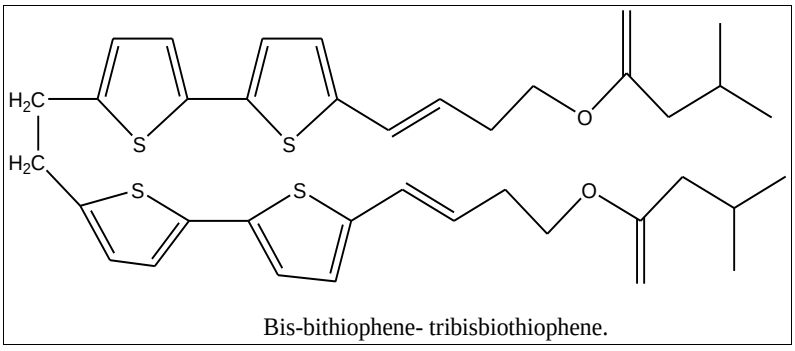
Luteolin



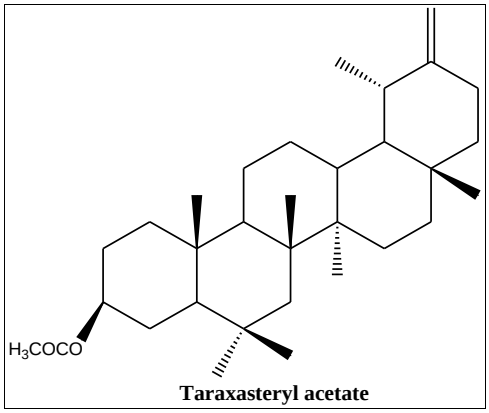
Beta-sitosterol



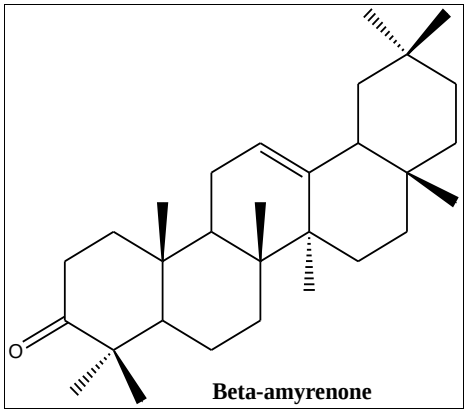
Tannins



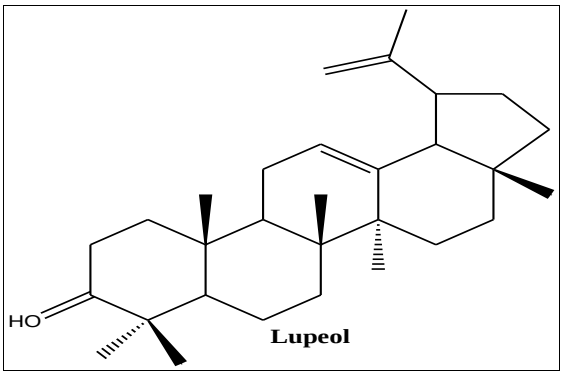
Bis-bithiophene- tribisbiothiophene.



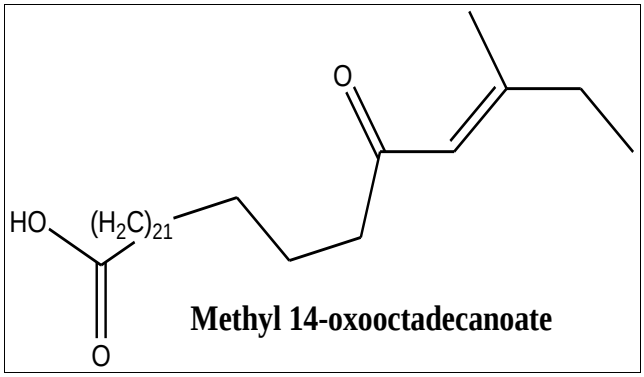
Taraxasteryl acetate



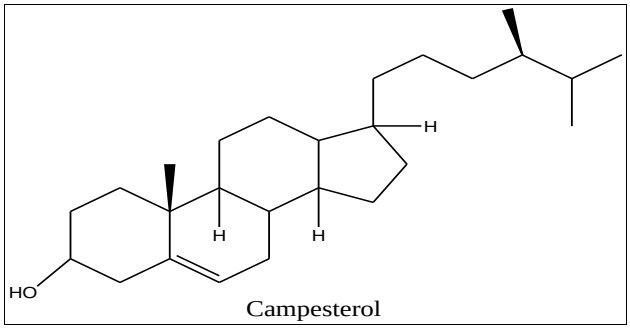
Beta-amyrenone



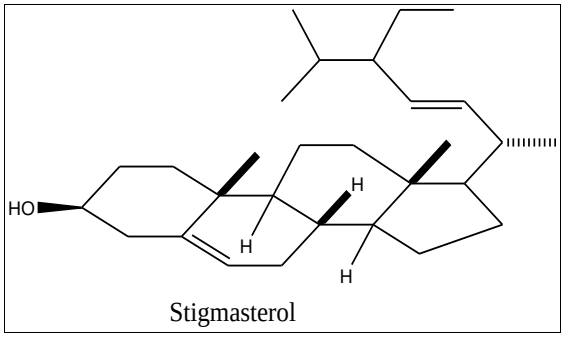
Lupeol



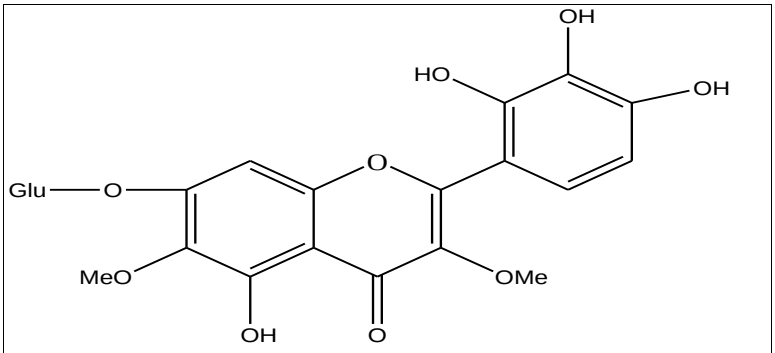
Methyl 14-oxooctadecanoate



Campesterol



Stigmasterol



3,6-Dimethoxy-5,7,2',3',4'-pentahydroxyflavone 7-O-Beta-D-glucopyranoside

Pharmacological activity

Prolongation of clotting time

T. procumbens extract 200 mg/µg IP injected to experimental rabbits, reduced normal heparin induced prolongation of clotting time [18].

Wound healing activity

Aqueous extract of *T. procumbens* (leaves) not only promoted healing but also overcame steroid depressed healing in experimental male wistar rats. The increased lysyl oxidase activity induced by the preparation has been suggested to be responsible for wound healing activity. The increased nucleic acid level indicates the action at cellular level [19].

Leaf juice of *Tridax procumbens* was shown to depress wound contraction in experimented animals. It involves a complex interaction between epidermal and dermal cells, the extra cellular matrix, controlled angiogenesis and plasma derived proteins coordinated by an array of cytokines and growth factors [20]. *Tridax* antagonized antiepithelization and tensile strength depressing effect of dexamethasone (a known healing suppressant agent) without affecting ant contraction and ant granulation action of dexamethasone. The plant increase not only lysyl oxidase but also, protein and nucleic

acid content in the granulation tissue, probably as a result of increase in glycosaminoglycan content [21].

Cardiovascular effects/Hypotensive effect

The cardiovascular effects of aqueous extract from leaf of *T. procumbens* were investigated on anaesthetized Sprague-Dawley rat. The IV administration of 3, 6, and 9 mg/kg of aqueous extract caused significant decrease in mean arterial blood pressure in a dose related manner. Higher doses of drug also cause significant reduction in heart rate. The hypotensive and Brady cardiac effects were immediate. The hypotensive effect was inhibited by pre-treatment of animal with atropine sulphate (1 mg/kg). The mechanism of action is possibly through activation of muscarinic cholinergic receptors [22].

Hepatoprotective activity

The hepatoprotective activity of aerial parts of *Tridax procumbens* was investigated against d- Galactosamine /Lipopolysaccharide (d- GalN/LPS) induced hepatitis in rats. DGalN/ LPS have been proposed to be hepatotoxic due to its ability to destruct liver cells. The multifocal necrosis produced by DGalN and the lesion of viral hepatitis in humans are similar. This amino sugar is known to selectively block the transcription and indirectly hepatic protein synthesis and as a consequence of endotoxin toxicity, it causes fulminate hepatitis within 8 hr after administration [23].Acute and chronic models of hepatic damage were studied recording morphology, metabolic, histological and biochemical parameter. *T. Procumbens* demonstrated antihepatotoxic action justifying its use in liver affection. Only the ethanolic extract and chloroform insoluble fraction exhibited hepatoprotective activity [24].

Antimicrobial activity

The methanolic extracts of *Tridax procumbens* leaves shows antibacterial activity by disc diffusion method revealed that the methanol extract have a broad spectrum activity on gram positive, negative organisms respectively. The highest activity was shown in S. Typhi S. flexneri and least activity on E.coli **[25]**. The extract of whole plant of *Tridax* showed antibacterial activity only against *Pseudomonas aeruginosa*. The disk diffusion method was used to test the antibacterial activity. Four strains of bacteria employed in test were two-gram positive *Bacillus subtilis, Staphylococus aureus* and two gram negative *Escherichia coli* and *Pseudomonas aeruginosa* **[26]**. A new flavone (C28H 24O11, mp.274oC) isolated from the leaves of *T. procumbens* identified as 5, 7, 4‘- trihydroxy-6, 3‘-dimethoxy flavone-5- O-alpha rhamnopyranoside (Glycoside) [27]. Their antibiotic activity was retained when formulated in mineral base and was more than that of Penicillin G 2 [28]. Antibacterial activity of aqueous extracts of *T. procumbens* observed against aeromonas hydrophilla and bacillus cereus [29].

The n-hexane extract of the flowers showed activity against E. coli. & active against *Mycobacterium smegmatis, E. coli*, Salmonella group C and *Salmonella* Paratyphi. The ethyl acetate extract of the flowers was active against *Bacillus cereus* and *Klebsiella* spp. The arial parts extract also showed activity only against *Mycobacterium smegmatis* and *Staphylococcus aureus,* while the aqueous extract showed no antimicrobial activity [30].

The flavonoid extracts showed remarkable activity against *A. Niger* whereas alkaloid extracts were found inactive against both the test fungi. Excellent antifungal potential was recorded for free flavonoid of stem and bound flavonoid of stem and flower *A. niger*. Study indicated that *T. procumbens* can be used as a source of formulations of antifungal drug for treatment of diseases caused by *A. Niger* [31]

Anti-juvenile hormone activity

Topical application of fraction of petroleum ether extract of *T. procumbens* showed remarkable effect on metamorphosis of Dysdercus and were found to be notable in generating abnormalities in adults due to juvenile hormone activity against laboratory colonized late fourth instars larvae and adult female mosquitoes. Petroleum ether extract *T. procumbens* showed growth inhibitory and juvenile hormone mimicking activity to the treated larvae of *C. quinquefasciatus*. Loss of fecundity was observed in the treated mosquitoes but no sterilant effects could be seen. larvae exposed to the plant extracts produced significantly shorter egg-rafits than in control [32].

Immunomodulatory activity

The immunomodulatory properties of ethanol insoluble fraction of aqueous extract of *T. Procumbens* have been investigated. IP administration of TPEIF in doses of 0.25 and 0.5 g/kg body weight (BW) a significant increase in phagocytic index, leucocytes count and splenic antibody secreting cells was noticed. Stimulation of humoral immune response was further observed with elevation in haemagglutination antibody titre. Heightened delayed type hypersensitivity reaction suggested convincing evidence for activation of cellular immune system. TPEIF influences both humoral as well as cell mediated immune system assists in genesis of improved antibody response against specific clinical antigen [33]. The immune modulatory properties of ethanolic leaf extract of *Tridax procumbens* on swiss albino rats orogastrically dosed with *Pseudomonas aeruginosa* was analysed [34].

The *in vitro* (phagocytosis) and in vivo (haemagglutination and delayed hypersensitivity) were used to study the effect of extract and fraction on the cellular and hormonal immunity. The results obtained indicate the ability of flavonoidal and Saponin fraction of *Tridax procumbens* to modulate both cell mediated and the hormonal components of the immune system and explored the phytoconstituents responsible for immunomodulatory potential of *Tridax procumbens* [35].

Antioxidant activity

Chloroform insoluble fraction of ethanolic extract of *Tridax procumbens* against D-galactosamine/ lippopolysacharide (D-galn/LPS)-induced hepatitis in rats. Induction of rats with D-galn/LPS (300 mg/kg body weight) leads to a marked increase in lipid peroxidation as measured by thiobarbituric acid:a reactive substance in liver. *Tridax procumbens* is very effective in alleviating the D-galn/LPS-induced oxidative stress suggesting its antioxidant property [36]. Fractions of methanolic extract from the aerial part were screened for antioxidant activity by DPPH method. The Ethyl acetate and n-Butanol fractions had shown significant activity which is comparable to the activity of standard antioxidant Ascorbic acid [37].

The reducing power ability analysed for antioxidant activity using the 1, 1-diphenyl-2-picrylhdrazyl (DPPH) assay and for total phenolics using Follian-cocalteu method. The ethanolic extract showed that *Tridax procumbens* has a percentage antioxidant activity of 96.70 which was observed to be higher than that of gallic acid (92.92) and ascorbic acid (94.81) used as standards. The total phenolic determination shows that

Tridax procumbens has a phenolic content of 12 mg/g GAE (Gallic acid equivalent).Plants is rich source of natural antioxidant [38].

Anti-inflammatory activity

Tridax procumbens extracts significantly reduced parameters like exudates volume leukocyte migration, edema fluid, granuloma tissue and γ-glutamyl transpeptidase depicted the good anti-inflammatory action of this plant. *Tridax procumbens* has negligible ulcerogenic property and causes anti-inflammatory activity through inhibiting SRs and PGs [39].

The aqueous extract of *T. procumbens* leaves was lyophilized and studied on the excision wound model, rat skin fibroblast and rat paw oedema. *T. Procumbens* did not significantly increase the fibroblast could compared with ibuprofen. The fibroblast cell count, hydroxyproline/DNA ratio collagen synthesis was insignificant in the control and *T. procumbens* treatment while ibuprofen and aspirin treatment had a significant effect on the above mentioned parameters. In the Carrageenan induced Oedema model, inhibition of Oedema was comparable in 200mg/kg *Tridax procumbens* and 50mg/kg ibuprofen treatment and the specific activity of the enzyme gamma glutamyl transpeptidase was comparable in the *Tridax procumbens*, ibuprofen and aspirin at 200 mg/ kg.[40].

The anti-inflammatory activity of *Tridax procumbens* was carried out on carrageenin-induced paw edema along with standard drug, Ibuprofen. The ibuprofen significantly reduced paw edema. The oral administration equi-effective dose of *Tridax procumbens* revealed about 20-35% more activity than the one rendered by Ibuprofen. The effect of *Tridax procumbens* along with various dose regimen of Ibuprofen showed greater anti-inflammatory activity than the Ibuprofen alone [41-42]. Anti-inflammatory activity of *Tridax procumbens* of aerial parts could be at least in part due to COX-1 and COX-2 enzyme inhibition and free radical scavenging activities may be attributed to the presence of flavonoids and other polyphenols in the extract [43].

Anti-cancerous activity

The effect of anti-cancer activity of traditional plant *Tridax procumbens* flower crude aqueous and acetone extract was tested on prostate epithelial cancerous cells PC3 was determined by measuring cell viability by MTT assay. 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 quantified spectrophotometrically at 570nm. The results of this analysis revealed the fact that flower crude extract has anti-cancer activity [44].

T. procumbens compounds were tested for Cytotoxicity against human lung cancer by MTT assay. The aqueous extract compound of Rf value 0.66 showed 90% reduced cell viability. NMR, MS and IR spectra revealed the compound as Lupeol. The anticancer potential of the Lupeol against human lung cancer has been evaluated by colonogenic survival determination, cell cycle control, Cell based assay for inhibition of COX-2 activity and DNA fragmentation analysis, an amount of 320 µg/ml concentration of Lupeol compound exhibited potential anticancer property [45]. *In vitro* anticancer activity of ethanol, acetone, and aqueous leaf extracts of *T. procumbens* was evaluated on selected cancerous cells lines by MTT assay and tryphan blue dye exclusion assay. Potent anticancer activity was shown by the acetone and ethanol leaf extracts of *T. procumbens* on A549 (human lung cancer cell line), Hep G2 (human liver carcinoma cell line) [46].

The hydrodistilled essential oil of *T. procumbens* contains total of 18 components by GC-MS analysis. Dibutyl phthalate (19.29%), Trans-(α)-caryophyllene (9.55%), Biformeme (3.95%), p-cymen-7-ol (2.52%), 1,8-cineole (2.44%). And the minor compounds are trans-α- Bergamotol (1.78%), 2-α-pinene (1.62%), α-Selinine (1.49%), Caryophyllene oxide (1.39%), α-humulene (0.95%), The obtained essential oil was tested against Human breast cancer cell line (MCF-7) for its anticancer activity by MTT assay with different concentrations of essential oil (18.5-300 µg/ml).. The IC50 value of MCF-7cell line was 96.6 µg/ml. This may be due to the presence of terpenes present in the oil [47].

Antiprotozoal activity

Extract prepared from plants used *in vitro* against epimastigote and tripomastigotes and *in vivo* against tripomastigotes. From the screened, six showed activity against bacteria, three against yeasts, five against *Microsporum gypsum* and five against *Trypanosoma cruzei in- vitro*. *In-vitro* and in *vivo* activity was demonstrated by *Varolaena lobata* and *Solanum americanum*: *in-vitro* or in-*vivo* activity was shown by Acalypha *guatemalensis*, *Petiveria alliacea* and *T. procumbens*, *S. americanum* was found to be toxic to Artemia salina (Aqueous, 160ppm) None showed acute or oral toxicity to mice. *S. Americanum* showed IP subacute toxicity [48].

Leishmanicidal activity

The *Tridax procumbens* whole plant Methanol extracts prepared from plants collected in the Yucatan peninsula and evaluated in an *in vitro* bioassay for leishmanicidal activity against *Leishmania mexicana* promastigotes. (IC50 < 50 µg/ml) [49].

Malarial vector repellency

The essential oils extracted by steam distillation from leaves of *Tridax procumbens* L. evaluated for their topical repellency effects against malarial vector *Anopheles stephensi* in mosquito cages. oils tested at three different concentrations (2, 4 and 6%). *T. procumbens* exhibited relatively high repellency effect (>300 minutes at 6% concentration), In general, clear dose-response relationships were established in all essential oils, with the highest concentration of 6%. [50].

Insecticidal activity

The essential oils isolated from *T. procumbens* exhibited insecticidal activities against house flies, mosquito larvae, *Dysdercus similes* and cockroaches. Essential oils of *T. procumbens* are highly potent, exhibits strong insect repellent activity, when tested against three varieties of ants. It was observed during the collection of *T. procumbens* that the plant is neither attacked by insects nor grazed by cattles suggesting that the plants posses' insect repellent or insecticidal activity [51].

Antidiabetic activity

The hypoglycemic properties of the ethanolic extract (TP-1) and its fraction were evaluated. The search was perused in normoglycemic and alloxan-diabetic rats. The blood sugar

level of diabetic rats were reduced by 10-17%, however this extract has no effect on fasted blood sugar level of the normal rats. oral administration of TP-2-1 could improve both oral and intraperitoneal glucose tolerance of normoglycemic rats [52].

Dried aqueous, alcoholic, and petroleum ether (60- 80°C) extracts of leaves of *Tridax procumbens* were subjected for hypoglycaemic activity in Wistar rats (150-200 g). Experimental studies revels that the aqueous and alcoholic extracts from *Tridax procumbens* leaves (200 mg/kg) orally administered for 7 days produced a significant decrease in the blood glucose level in the model of alloxan-induced diabetes in rats [2].

The anti-hyperglycemic potential of *Tridax procumbens* was also evaluated during which oral administration of acute and sub-chronic doses (250 and 500 mg/kg body weight) of ethanolic extract of *Tridax procumbens* showed a significant reduction in fasting blood glucose levels in diabetic rats compared with the standard drug Glibenclamide (10 mg/kg body weight) [53].

95% ethanol extracted T. procumbens treated with diabetes induced male Wistar rats by streptozotocin (50 mg/jk, i.p.) and nicotinamide (120 mg/kg, i.p) injection. Diabetic rats were treated with glibenclamide (0.25 mg/kg, p.o.) as a std T. & procumbens extract (250 and 500 mg/k, p.o.) for 21 consecutive days.., serum lipid profile and liver enzymes levels were analyzed for all the experimental animals and compared with diabetic control. The ethanolic extract of the whole plant of T. procumbens at 250 and 500 mg/kg has significant antidiabetic and antihyperlipidemic activities. The diabetic control animals exhibited a significant decrease in body weight compared with control animals. T. procumbens inhibited streptozotocin-induced weight loss and significantly alter the lipid levels [54].

Acute and Sub Chronic Toxicity

The acute toxicity was carried out using the method of Lorkes. In the subchronic study, rats received intraperitoneal T. procumbens at doses of 50, 100, 200, 400, and 800 mg/kg for 14 consecutive days. Serum biochemical parameters, haematological analysis and histopathology of liver and kidneys were assessed after the last administration. The LD50 of the extract was 2100 mg/kg body weight, and all the survived animals gained body weight and organ / body weight ratio as compared to the untreated control ($P<0.05$). In sub chronic study, all the animals gained body weight and organ / body weight ratio. The results of histopathological studies showed that ethyl acetate extract had endothelial toxicity at high dose level destroying the blood vessels leading to haemorrhage as indicated by haemosiderin deposition throughout the entire kidney and liver parenchyma [55].

Antitubercular potential

Phytochemical study and antitubercular potential of methanol: water (MW), ethanol: water (EW) and dichloromethane: methanol (DM) of extracts of *Tridax procumbens* (L) tested against of H37Rv mycobacterium tuberculosis using microplate alamar blue assay(MABA) method. Preliminary phytochemicals studies and HPTLC finger print analysis revealed the presence of phytochemical like alkaloids, flavonoids, saponins, tannins, phenolic group, glycosides, terpenoids with different Rf values. The ethanol: water extracts of *Tridax. P* exhibited significant anti-tuberculosis activity with the MIC values of 0.8µg/ml, 6.25µg/ml compare to standard drug pyrazinamide, ciprofloxacin and streptomycin with the MIC values of 3.125 µg/ml-6.25 µg/ml using MABA respectively against Mycobacterium tuberculosis (H37 RV strain) ATCC No-27294. The presence of flavonoids, tannins, phenolic group may contribute to the observed anti-tubercular activity [56].

Conclusion

Review shows that the *Tridax procumbens* Linn. is a rich medicinal plant. Phytochemically, pharmacologically as well as traditional medicinal systems also proves this. Every part of plant & histopathological, phytochemical study reveals presents of site and sources of phyto molecules. *Tridax procumbens* shows presence of a number of valuable constituents such as flavone glycoside, glycoside, bithiophene, flavonoid (Procumbenetin), sterols, terpenoids, lipids and polysaccharides with significant pharmacological activities such as antimicrobial, wound healing, cardiovascular, antidiabetic activity, hepatoprotective, anti-inflammatory, antioxidant, antidiarrhoeal, insecticidal, leishmanicidal & it also possesses anticancer, immunomodulatory action and antitubercular activity, which provides the basis for isolation & development of new phytochemical useful to treat the acute and chronic disease as rational problem worldwide. Compare to synthetic molecule phytomolecule are less toxic, this is the advantage that we get new research area to develop new active phytomolecule.

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