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Biological Activities and Phytochemical Constituents of Trailing Daisy Trilobata: A Review

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ABSTRACT

The traditional system of medicinal plants have been found to possess significant anti-inflammatory, antibacterial, anti-fungal, anti-diabetic, analgesic properties etc. Plant-derived drugs are used to cure mental illness, skin diseases, tuberculosis, diabetes, jaundice, hypertension, and cancer. *Wedelia Trilobata* belongs to family Asteraceae. Leaf, stem, and flower of *Wedelia trilobata* show anti-microbial, anti-oxidant and anti-inflammatory activity, analgesic activity. Phytochemical screening of the extract has been reported to show the presence of tannins, cardiac glycosides, flavonoids, terpenoids, phenols, saponins, and coumarins. *Wedelia Trilobata* is also used in reproductive problems, amenorrhea, chest cold, dry cough, and fever. The present review aims to the study was phytoconstituents, biological and pharmacological activities of *Wedelia trilobata.* This study suggested a possible use of *Wedelia trilobata* as a source of natural medicines as an anti-inflammatory, anti-oxidant, anti-microbial, hepatoprotective, antidiabetic agents.

Keywords: *Wedelia Trilobata*, Trialing daisy trilobata, Complaya trilobata(L), Sphagneticola Trilobata, pharmacological review.

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Introduction:

The introduction of plant-derived drugs in modern medicine has been linked to the uses of plant-derived materials as an indigenous cure in the traditional system of medicine. Some of the plants have been used for the treatment of antibacterial, antifungal, anticancer, anti-diuretic, anti-inflammatory, anti-diabetic medicines at a lower cost and lesser side effects than marketed drugs. Various chemical constituents have been isolated from medicinal plants. Some plant-derived drugs have been used to various diseases like mental illness, skin diseases, tuberculosis, diabetes, jaundice, hypertension, cancer etc[1].

Wedelia trilobata belongs to family Asteraceae is a highly resistant, creeping, perennial plant, with succulent stems. *Wedelia trilobata* is also known as Trailing daiay trilobata[2]. It has a very old tradition of wide medicinal use it a high reputation in Ayurveda, Unani, Siddha, and Traditional Chinese medicine and also in traditional systems of healing in the Carribean, Central and South America. The extracted essential oil of *Wedelia trilobata* has been found to act itself as an antioxidant, antibacterial, antifungal, anti-inflammatory, cough relieving agent, hepatoprotective, febrifuge, immuno-stimulatory and analgesic agent. The present review aims to address the ethnopharmacological uses, phytochemical constituents and reported pharmacological activity of Trailing daisy trilobata[3].

Description of *Wedelia trilobata:*

Habitat: A weed of urban bushland, closed forest margins, open woodland, waterways, lake margins, wetlands, roadsides, disturbed sites, waste areas, vacant lots and coastal sand dunes in tropical and sub-tropical regions. It may also encroach into lawns, footpaths, and parks from nearby gardens.

Geographical Distribution: Native to India, A.P, Chittor district, Mexico, Central America (i.e. Belize, Costa Rica, Guatemala, Honduras, Nicaragua and Panama) the and throughout the Caribbean, where it is noted as a weed in Trinidad, Puerto Rico, the Dominican Republic, Jamaica, Panama and tropical South America(i.e. French Guiana, Guyana, Surinam, Venezuela, Brazil, Bolivia, Colombia, Ecuador, and Peru). Naturalized in South Africa, Florida, Louisiana, Hawaii, Puerto Rico, and the Virgin Island. Escaped in many tropical regions of the world including

Australia (south-eastern Queensland and north-eastern New South Wales). The Pacific Island (i.e. American Samoa, the Cook Island, Fiji, French Polynesia, Guam, Kiribati, the Marshall Islands, Nauru, Niue, New Caledonia, Palau, Western Samoa, Tonga, and Hawaii), Malaysia, Indonesia, Thailand, India, Papua New Guinea.

Taxonomical Classification:

Domain: Eukaryota

Kingdom: Plantae

Phylum: Spermatophyta

Subphylum: Angiospermae

Class: Dicotyledonae

Oder: Asterales

Family: Asteranceae

Genus**:** Sphagneticola

Species: *Sphagneticola trilobata*

Vernacular Names:

Telugu: Guntagalagara.

English: Bay Biscayne creeping-oxeye.

Hindi: Pilabhangara, Bhangra.

Tamil: Manjalkarilamkanni, patalai kavyantakara.

Malayalam: Mannakkannunni.

Kannada: Gargari, kalsarji.

Synonyms:

Wedelia trilobata(Rich.) Bello

Complaya trilobata(L.)

Strother, Silphium trilobatuml.,

Thelechitonia trilobata(L.) H.Rob. & Cuatrec.,

Wedelia carnosa Rich.,

Figure: 01 *Sphagneticola trilobata*

Pharmacological Activities

1. Anti-inflammatory Activity:

Meena *et.al* (2011) investigated four herbal drugs used in traditional Medicine including *Wedelia tribolata* on the anti-inflammatory activity. They reported that all the extracts reduced croton oil-induced ear dermatitis. Results suggested that lipophilic extracts are potential source was found to possess have significant anti-inflammatory activity[4].

Maldini *et.al* (2009) studied anti-inflammatory activity using in-vitro models such as albumin denaturation and heat-induced hemolysis. An ethanol extract of *Wedelia trilobata* demonstrated anti-inflammatory activity, vice suppression of lipopolysaccharide-induced cytokine and nitric oxide production in peripheral blood mononuclear cells[5].

2. Anti-microbial:

Maori *et.al*. (2009) conducted a study on Anti-microbial activity of *Wedelia trilobata,* by using Disc- diffusion method. The activity of curd extract from *Wedelia trilobata* against gram-positive, gram-negative bacteria, yeast, and fungi was evaluated. The n-hexane extract showed antibacterial activity against Bacillus subtilis, Mycobacterium smegmatis, and Pseudomonas aeruginosa, Salmonella group C, S Paratyphi and Shigella sonnei. The aqueous extract was active only against salmonella group C, inactive against other tested bacteria. None of the tested extracts showed biological activity against yeast and fungi[6].

Mandal *et.al.* (2005) conducted a study on the antimicrobial activity of *Wedelia trilobata.* Aqueous extract of leaf, stem, flower inhibited the growth of all the bacterial isolates, but the extracts did not show any similar significant effect on fungi isolates. The leaf extract showed more potent activity against Pseudomonas aeruginosa, E.coli, Pseudomonas. fluorescens, Xanthomonas oryzae Proteus Vulgaris.oryzae, Xanthomonas. axanopodis Proteus Vulgaris.malvacearum moderately inhibited the Clavibacter minchiganensis sub sp. Minchiganesis but less activity was observed on Staphylococcus aureus. All the extracts exhibited less activity on all species of Fusarium and Aspergillus[7].

3. Analgesic:

Suresh Kumar *et.al.* (2007) conducted a study on *Wedelia trilobata* by acetic acid-induced writhing method and hot plate assay to assess analgesic activity in mice. It was found that the extract caused an inhibition of the writhing response induced by acetic acid a dose depended manner (500mg/kg). The results reflect analgesic effects and the therapeutic efficacy of the extract in animal models was comparable with that of standard drugs such as aspirin and morphine[8].

Teerapol srichana *et.al.* (2014) conducted a study in mice on the analgesic activity of ethanol extract of *Wedelia trilobata* by the acetic acid-induced writhing method. The extract showed dose depended (500mg/kg) blocking of writhing response. kaurenoic acid(10mg/kg) obtained from *Wedelia trilobata* inhibited over nociception, acute carrageenin, & PGE2 induced complete Freund's adjuvant (CFA) and chronic induced mechanical hyperalgesia. The results reflect analgesic effects and therapeutic efficacy of the extract on animal models which are comparable with that of standard drug aspirin[9].

4. Hepatoprotective activity:

Karamegam *et.al.*(2008) conducted a study on ethanolic leaf extract of *Wedelia trilobata* against carbon tetrachloride CCl_4 induced acute hepatotoxicity in rats. There was shown a significant reduction ($P<0.05$) in the levels of protein, bilirubin and organ weight including liver, heart, left lung, spleen, and kidney without any significant changes in body weight. The treatment of ethanol leaf extract showed a dose-dependent reduction of CCl_4 induced elevated serum levels of enzyme activities with a parallel increase in total protein & bilirubin[10].

Lin *et.al.* (1994) investigated the hepatoprotective effect of *Wedelia trilobata.* Acute hepatitis was induced by three hepatotoxins, such as carbon tetrachloride, acetaminophen

in mice and galactosamine in rats after treatment with *W. trilobata* (300 mg/kg) a reduction in the elevated serum glutamate oxaloacetate transaminase and glutamate pyruvic transaminase levels was observed at 24 hours after hepatotoxins were administration. It was concluded that *Wedelia trilobata* has a definite hepatoprotective effect against liver injuries[11].

5. Anti-diabetic:

Sunita Kanikaram *et.al.* (2018) determined the anti-diabetic activity of crude extracts of *Wedelia trilobata* along with *Brassica oleraceae* by applying in vitro α-amylase inhibition method. The methanol extract of *Wedelia trilobata* significantly showed DPPH inhibition with IC_{50} 20 µg/mL and in vitro α-amylase inhibition IC_{50} 50µg/mL. It was concluded that methanol extract of *Wedelia trilobata* can be a potential source of anti-oxidant and as good anti-diabetic[12].

Pradeep *et .al.*(2014) conducted a study on methanolic extract of *Wedelia trilobata* using in- vitro glucose diffusion, α-amylase, α-glycosidase & angiotensin I converting enzyme inhibition method. They showed an inhibitory effect on the α-glucosidase enzyme. Glucose movement from sealed dialysis tube to an external solution was inhibited by *Wedelia trilobata* extract. The methanol extract of *Wedelia trilobata* inhibited the rabbit lung angiotensin I converting [13] enzyme with Ic50 of 30µg/mL. Biological and pharmacological activities are explained in Table.2.

Table 2: Biological and pharmacological activities reported

Activity	Method	Parameters	Reference
1.Anti inflammatory activity	**a.** In vitro Heat-induced albumin denaturation.	Albumin denaturation	GovindappaM.Naga (*et.al* 2011)[14].
	b. In vivo Croton oil-induced ear oedema in rats.	Inhibition of plasma extravasations and neutrophil migration	Giovanafucina(*et.al* 2016)[15].
	c. In vitro Heat-induced albumin denaturation and red blood cell membrane denaturation.	protein denaturation	Naga sravya s (*et.al* 2011)[16].
	d. In vitro Lipo poly saccharide: (LPS) induced nitric oxide	A cell as well as cytotoxic activity	Nguyen Phuong thao (et.al 2019).[17]
	e. In vitro nuclear staining and DNA fragmentation assays.	Induces apoptosis in MEG-01 cells	Satish Kumar Murari (*et.al*2016).[18]
2. Antimicrobial	**a.** In vitro disc diffusion method.	It shows a zone of inhibition on *Staphylococcus aureus*, *X. oryzae*pv. *Oryzae*	Taddei A. (*et.al* 1999).[19]
	b. In vitro Agar well as disk diffusion method and minimum inhibitory concentration method	A moderate inhibitory activity against all bacterial species with zones of inhibition	Diptanu biswas (*et.al* 2013).[20]
	c. In vitro antimicrobial activity of n-hexane inhibited by bacillus subtilis	Inhibited the growth of bacillus subtilis shows yeast and fungi	Antonietataddei (*et.al* 2006).[21]
	d. In vitro agar disc diffusion method	Human pathogenic bacteria was tested	J. Chethan (*et.al* 2012).[22]
	f. In vivo broth microdilution method in dogs.	Activity against bacteria Escherichia coli in human and dog skin	Ana greiceborbaleite (*et.al* 2019).[23]
4.Analgesic activity	**a**. In vivo Kaurenoic acid-induced, PGE2 method in mice.	Blocked the writhing response	Suresh kumar (*et.al* 2007).[24]
	b. *In vivo* isoprenaline-induced myocardial infarction in rats	Blocking the mitochondrial lipid peroxidation (LPO).	Rangasamy Rajesh (*et.al* 2007).[25]
	c. In vivo acetic acid-induced writhing method and hot plate in mice.	Blocking writhing response	S.Bhama (*et.al* 2007).[26]
5. **Hepato protective activity**	**a.** In vivo Croton oil-induced ear dermatitis in rats	Inhibition of writhing response	Meena (*et al* 2011).[27]
	b. In vivo CCl_4 induced acute hepatotoxicity in rats	Serum aspartate transaminase (AST) and alanine transaminase (ALT)	Karmegam (*et al* 2008).[28]
6. Anti diabetic	**a**. In vitro α-amylase inhibition method.	IC_{50} of α-amylase shows Insulin dysfunction.	Sunita Kanikaram (*et al* 2018).[29]
	b. In vitro Heat-induced albumin denaturation	Protein denaturation.	Pradeep (*et.al*.2014). [30]

Phytochemical Constituents Reported in *Wedelia trilobata*:

The secondary metabolites from these plants mainly include terpenoids, flavonoids, and polyacetylenes as well as steroids. The leaves and stem contain eudesmanolide lactones, Luteolin, and kaurenoic acid. Different classes of phytoconstituents such as sesquiterpenoids, triterpenoids, and diterpenoids have been reported from the aerial parts, and the flower of *Trailing daisy trilobata* shown the presence of sterols, flavonoids, Benzene derivatives. Most constituents of oils belong to the large group of terpenes. The essential oil obtained from the leaves of *Wedelia trilobata* was analyzed by GC/MS. Which shows α-pinene (above 30%), α-phellandrene (17.4%) and limonene (16.3%) as major components Phytochemical constituents are explained in Table.3

Table 3: Phytochemical Constituents reported in *Wedelia trilobata*

Plant part	Phytoconstituents	Reference
Aqueous extract of aerial parts	Terpenoids, flavonoids, polyacetylenes and Steroids.	Sadananda (et.al 2011).[31]
Aqueous extract of Leaves and stem	Eudesmanolide lactone, luteolin and Arachidonic acid.	Sharanappa (et.al 2011).[32]
Ethanol extract of aerial parts	Sterols, flavonoids, Benzene derivatives.	Guaratini (*et.al* 2016).[33]
A methanol extract of Leaves	Terpenes	Hoepers (*et. al*. 2016).[34]
Essential oils obtained from leaves analyzed by GC/MS	α -pinene. α -phellandrene. Limonene	Govindappa *et.al*. (2011).[35]

Conclusion:

Presently there is an increase in the significance of herbal medicines with amplified laboratory investigations of biological and pharmacological properties. The plant *Wedelia trilobata* emerged as a good source of medicine with anti-inflammatory anti-microbial, analgesic, anti-oxidant, hepatoprotective and anti-diabetic properties. A large number of phytoconstituents have been isolated and identified from different parts of *Wedelia trilobata* which include flavanoids, triterpenoids luteolin, arachidonic acid, sterols and other constituents of the essential oil reported are α-pinene, α-phellandrene and limonene. The current review on *Wedelia trilobata* can be a good source of information for further research to explore their full therapeutic activity.

Conflicts of Interest: None

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