



Euphorbia hirta Linn: A Potential Medicinal Herb

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ABSTRACT:

The oldest remedies known to mankind are herbal medicines. India is known worldwide for its Ayurvedic treatment. Euphorbia hirta is often used traditionally for female disorders, respiratory ailments (cough, bronchitis, and asthma), worm infestations in children, dysentery, jaundice, pimples, gonorrhea, digestive problems, and tumors. The plant has also been used as anti-inflammatory, antioxidant, antitumour, antidiabetic and free radical scavenging, anti allergic, analgesic and antianaphylactic, antioxytic, sedative, antiarthritic, anti diarrhoeal, spasmogenic, antithrombocytopenic, diuretic, GI tract, burn wound healing, immune stimulatory, sperm motility, genotoxic, synergic, antiviral, anthelmintic, immunoprophylactic, antimalarial, antimicrobial, herbicidal, antimolluscidal, larvicidal property Euphorbia hirta Linn. is a small herb, belongs to family Euphorbiaceae. The review paper focused on different pharmacological, phytoconstituents and their nutritional value of this plant.

KEYWORDS:

Antioxidant, antimalarial, antibacterial, Euphorbia hirta, Pharmacological activity, Family.

INTRODUCTION:

Euphorbia hirta is frequently known as "Asthma plant" in English and "Dudhi" in Hindi. The plant is widely distributed throughout the globe, and in Asia, it is mainly found in Yemen, Oman, Palestine, Taiwan, Syria, Lebanon, India, Bhutan, Pakistan, Nepal, Myanmar, Thailand, Sri Lanka, Indonesia, Malaysia, and Papua New Guinea. The plant belongs to the genus Euphorbia in the family Euphorbiaceae. The morphological features of E. hirta include a slender stem with hair development and many branches arising from it from base to top.

The plant is an annual, purple or reddish in color, and grows to a height of about 40 cm [1]. The juice of the plant is given for dysentery and colic, and its decoction is used in asthma and chronic bronchial affections. The root is used to treat vomiting, and the plant's leaves are used to reduce gastric motility and, in some cases, to treat diarrhea. [2] The largest genus in the family Euphorbiaceae is Euphorbia, with about 1600 species. It is characterised by the presence of white milky latex, which is more or less toxic. [3]

Latices of E. ingens, E. mey, E. tirucalli, and E. t E. hirta belongs to the plant family Euphorbiaceae and genus Euphorbia. It is a slender-stemmed, annual hairy plant with many branches from the base to top, spreading height, reddish or purplish in color. Leaves are opposite, elliptic - oblong to oblong-lanceolate, acute or subacute, dark green above, pale beneath, 1- 2.5 cm long, blotched with purple in the middle, and toothed at the edge. The fruits are yellow, three-celled, hairy, keeled capsules, 1-2 mm in diameter. [4] riangularis are possible sources of rubber.



Fig. 1. *Euphorbia hirta* plant

TAXONOMICAL CLASSIFICATION:

- Kingdom-Plantae
- subkingdom- Viridaeplantae
- Infrakingdom- Straptophyta
- Division- Tracheophytina
- Infradivision -Angiosperms
- Class- Magnoliopsida
- Superorder- Rosanae
- Order -Malpighiales
- Family- Euphorbiaceae
- Common Name-Asthma plant
- Botanical Name- *Euphorbia hirta* Linn. [5]

synonyms

Euphorbia hirta has many local names in different countries such as, China: Feiyangcao, Arab: Labeinah, Malaysia: Ambin jantan, English: Asthma plant, Indonesia: Daun biji kacang, Malay: Moluccas, Sundan: Nanangkaan, Britain: Gunantuna, Thailand: Nam nom raatchasee, India: Dudhi ,West Bengal, Bangladesh:Boro Keruie, Japan:Gelang Susu, Australia:Asthma herb .[6 7 8]

MORPHOLOGY OF PLANT:

Leaves

The leaves are opposite, biculate, and simple, the stipules are linear, the leaf blade is lanceolate, oblong serrated, long elliptic, tapering, 3–4 cm long and 1–1.4 cm wide, and its margin is smoothly serrated.[9]

Flowers

The monoecious inflorescence, an axillary or terminal cluster of flowers, is known as a cyathium, in which several cyathia are arranged in a cyme. The male and female flowers are in a pod and have the same name. The flowers are unisexual; male flowers are sessile; prophylls are linear and fringed; perianth is absent and has a stamen; female flowers have a small peduncle; the perianth is fringed; the ovary is covered with tiny hairs above; it is 3-celled; it has 3 styles; and the tip is double. The flowering period is usually year-round.[10]

Fruit

The fruit is allomorphic, pistillate, elongated, 3-lobed, and has an obtuse base covered with shoot hairs.[11]

seed

Seeds are oblong, 4-sided prismatic, wrinkled, and brownish pink in colour; capsules are 3-seeded, green, and covered with fleshy spines; seeds have smooth, hard, mottled crustal skin. with a white caruncle at the top enclosing oily endosperm. [12.13, 14.15]

NEUTRITIONAL VALUE:

Euphorbia hirta contains flavonoids, terpenoids, phenols, essential oils, and other compounds. The protein content, essential amino acids, sugar, fat, and essential minerals, antioxidants, fat, protein, carbohydrate, fibre, and mineral content in the leaves of the medicinally important plant *E. hirta* Linn are all important. [16]

TRADITIONAL USE:

Commonly, *E. hirta* is used to treat many ailments like gastro-intestinal disorders, respiratory diseases like cough, cold, asthma, bronchitis, hay fever, emphysema, various ocular ailments, skin and mucous membrane problems (guinea worm, scabies, tinea, trush, aphtha), and tumours. In south India, it is used as ear drops and as a treatment for wounds. The latex of the plant is often used for warts and cuts to prevent pathogen infection.[17]

ETHNOVETERINARY USES:

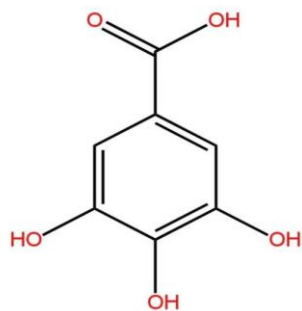
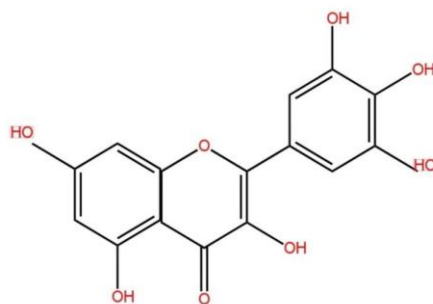
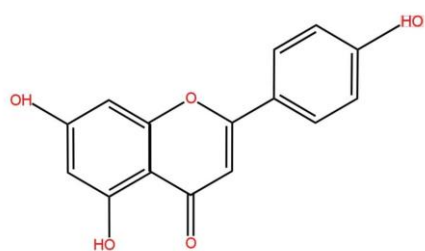
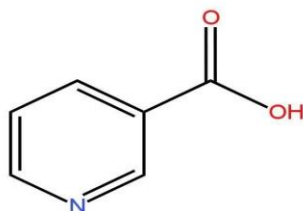
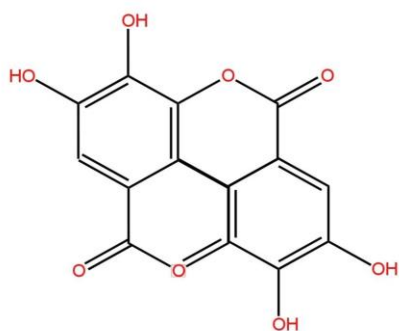
The fresh milky latex is applied to wounds and warts, and the root of the plant is used in sprains and inflammation, miscarriage, epilepsy, maggots in wounds, and irregular growth of teeth.[18]

CHEMICAL CONSTITUENTS:

The aerial parts of plant are well investigated for chemical information.[19] Flavonoids: Euphorbianin, leucocianidol, camphol, quercitrin and quercitol. [20, 21] oylquinic acid, 2,4,6-tri-O-galloyl-Dglucose, 1,2,3,4,6-penta-O-galloyl- β -D-glucose [22, 23] Polyphenols: Gallic acid, myricitrin, 3,4-di-O-gall Tannins: Euphorbins A, B, C, D, E [24]. Triterpenes and phytosterols: β -Amyrin, 24-methylenecycloartenol, and β -Sitosterol.[25] Alkanes: Heptacosane, n-nonacosane and others .[26]

Name of the parts of plant	Chemical constituents	Pharmacological activity
Leaves	carbohydrates, amino acids, proteins, alkaloids, flavonoids, terpenoids, tannins, phenols, steroid, glycoside, saponin, coumarin, anthraquinone, volatile oils, gums and mucilage, fat, and oils. [27]	Antidiabetic, Antioxidant, Antimicrobial, Antipyretic, Antiallergic, Antitumor .[28]
Roots	carbohydrates, alkaloids, flavonoids, terpenoids, tannins, saponins, and reducing sugars sugars.[29]	analgesics, antioxidants, anti-inflammatory, anti-cancer, anti-diabetic, diuretic antioxidant. [29]

Table no 2. Plant chemical constituents and their pharmacological properties

chemical constituents' structure:**Gallic acid****Myricitrin****Quercetin****Nicotinic acid****Ellagic acid****PHARMACOLOGICAL ACTIVITIES:****Antibacterial/antifungal activity**

Since the 1980s, the antibacterial activity of *E. hirta* has been comprehensively investigated and proven. Vijaya et al. (1995) evaluated the antibacterial potential of the methanol extract of *E. hirta* in 1995. Results showed that the extract exhibited properties against dysentery-causing *Shigella* spp. using the Vero cell line. Cytotoxicity studies of the extracts were performed using the cell line, and the non-cytotoxic concentration of the extract was tested for antibacterial activity against the cytotoxic dose of the pathogen. The extracts were found to be non-cytotoxic and effective antibacterial agents. [30]

Wound healing activity:

The ethanolic extract of the whole plant of *E. hirta* possesses significant wound healing activity. The histopathological study, WBC count, and hemostatic activity were carried out to support its wound healing activity. The ethanolic extract of *E. hirta* has promoted wound healing activity, and a probable mechanism may be the promotion of collagen biosynthesis, which further supports an increase in the tensile strength of the granuloma tissue. This evidence supports the use of *E. hirta* in the management of wounds. [31]

Anti microbial activity:

Antimicrobial compounds are compounds that inhibit the growth or cause the death of microbes. Various pathogenic microbes cause various diseases in humans; therefore, plants that produce antimicrobial compounds have the potential to be developed for infectious drugs, especially for digestive tract infections. *Euphorbia hirta* leaves are traditionally used for the treatment of ulcers, overcoming dysentery, digestive tract infections, and skin infections. *Escherichia coli*, *Klebsiella pneumoniae*, *Shigella dysenteriae*, *Salmonella typhi*, and *Proteus mirabilis* are a group of gram-negative bacteria that often cause gastrointestinal infections in humans [32].

Antidiabetic effect:

The ethanol extract of *Euphorbia hirta* showed a significant decreased blood glucose level on alloxan-induced diabetic rats. [33] The antidiabetic effect of ethanolic extract of leaf, flower and stem of *Euphorbia hirta* was investigated in streptozotocin-induced diabetic mice. Oral administration of all extracts induced significant reduction in blood glucose level at the 15th day of the study. [34] Ethanol extract and ethylacetate fractions showed α -glucosidase inhibition activity. Based on the *in vitro* and *in vivo* test, *Euphorbia hirta* ethanolic extract and ethyl acetate anti-diabetes mechanism was related to its antioxidant capacity and to α -glucosidase inhibitory properties. [35]

Antithrombocytopenic activity:

The antithrombocytopenic effect of a lyophilized decoction of *Euphorbia hirta* Linn was studied by Jovencio G. Apostol et al. (2012) in Sprague-Dawley rats. Within 7 days of ethanol induction, rats developed thrombocytopenia. Platelet count, bleeding time, and clotting time were assayed in four groups of rats. A significantly increased platelet count and decreased bleeding and clotting time were observed after *Euphorbia hirta* treatment. Histopathological studies showed decreased liver sinusoidal dilation in *Euphorbia hirta*-treated groups. *Euphorbia hirta* decoction, therefore, acts as a potential antithrombocytopenic. [36]

Antifungal activity:

An ethanolic extract of *E. hirta* showed antifungal activity against plant pathogens *Colletotrichum capsici*, *Fusarium pallidoroseum*, *Botryodiplodia theobromae*, *Phomopsis caricae-papayae*, and *Aspergillus Niger* using the paper disc diffusion technique. [37]

Galactogenic activity:

The powdered *E. hirta* showed galactogen activity in guinea pigs before puberty by increasing the development of the mammary glands and inducing secretion. [38]

Aflatoxin inhibition activity:

An aqueous extract significantly inhibited aflatoxin production on rice, wheat, maize, and grow. [39]

Anxiolytic and Sedative Effect:

The hydroalcoholic extract of the plant was investigated for anxiolytic effects in chronically stressed rats, and it was observed in two different stressors: chronic immobilisation stress (CIS) and forced swim stress (FSS). The findings demonstrate the anxiolytic potential of *Euphorbia hirta*, particularly in CIS-induced anxiety. Another study showed the behavioural effects of the extract in mice. Lyophilized water extract does not show any mortality when administered orally, particularly in CIS-induced anxiety. Another study showed the behavioural effects of the extract in mice. Lyophilized water extract does not show any mortality when administered orally. [40]

Antidiarrheal activity:

The antidiarrheal effect of the herb decoction was studied in mice. It demonstrated activity in models of diarrhoea induced by castor oil, arachidonic acid, and prostaglandin E2. [41] Quercitrin, a flavonoid glycoside isolated from *E. hirta*, showed antidiarrheal activity at a dose of 50 mg/kg against castor oil and prostaglandin E2-induced diarrhoea in mice. [42]

Hepato-protective Property:

The anti-hepatotoxic property of the hydroalcoholic decoction of the plant was investigated in animal models of liver injury in animals induced by CCl₄ or paracetamol. The serum levels of animals given the extracts (125 and 250 mg/kg) were significantly lower (P 0.05 and 0.01, respectively) than those of CCl₄- or paracetamol-treated animals. [43,44]

Anti-arthritic Property:

A research investigation was done to observe the anti-arthritic properties in an animal model. The results suggest that *Euphorbia hirta* has improved adjuvant induced arthritis. [45]

Anthelmintic, Molluscicidal Larvicidal Property and Larvicidal property:

The water extract of the plant reduced the fecal egg count of the helminths in Nigerian dogs and exhibited potentiality as an anthelmintic agent. The study highlighted the larvicidal activity of *Euphorbia hirta* against the third instar larvae of *Anopheles stephensi*, the urban malaria vector. The latex was considered as a plant-derived molluscicide agent against snails. [46,47]

Galactogenic Property:

The dried plant powder was given to female Guinea pigs before puberty, and the study showed that it increased the development of the mammary glands and induced milk flow. [48]

Anticancer property:

Several traditionally used medicinal plants are thought to have preventive effects against different human malignancies, including cancer. These plants are rich in chemicals that show modulatory effects on different physiological functions and target the proliferation of cancer cells. *E. hirta* has been reported to produce significant anticancer effects in vitro against acute myeloid leukaemia HL-60 cells [49] Furthermore, extracts from *E. hirta* have revealed anticancer effects against squamous cell carcinoma, Hep-2,2 and malignant melanoma. [50]

Conclusion:

Euphorbia hirta is a valuable medicinal plant used globally in different traditional systems of medicine. We attempted to provide morphological, phytochemical, and ethnopharmacological information on *E. hirta* in this review. This herb shows antibacterial, anti-inflammatory, antimalarial, antidiarrheal, anticancer, antioxidant, anti-amoebic, and antifungal activities.

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