

**REVIEW ON PHYTOCHEMISTRY AND PHARMACOLOGICAL
ASPECTS OF *EUPHORBIA HIRTA* LINN. (FAMILY-
EUPHORBIACEAE)**

Shraddha R. Chate^{1*}, Vishakha S. Shingote², Mohini Upadhye¹ and Sonali Chintamani¹

¹PES Modern College of Pharmacy Moshi (For Ladies).

²Pravara Rural College of Pharmacy Pravaranagar, Tal Rahuri Dist – Ahmednagar.

Article Received on
24 Oct. 2021,

Revised on 14 Nov. 2021,
Accepted on 05 Dec. 2021

DOI: 10.20959/wjpr20221-22549

***Corresponding Author**

Shraddha R. Chate

PES Modern College of
Pharmacy Moshi (For
Ladies).

ABSTRACT

Medicinal herbs are the local heritage with global importance. The plant grows in open grass land roads side and pathways it also known as ASTHMA PLANT. Medicinal herbs have curative properties due to presence of various complex chemical substance of different composition, which are found as secondary plant metabolites in one or more parts of these plants. These plant metabolites according to their composition are grouped as alkaloids, glycosides, corticosteroids, essential oils etc. *Euphorbia hirta*, (family- Euphorbiaceae) is an herb found in many parts of the world. In Sanskrit it means “Dugadhika”. According to the Doctrine of Signatures, the plant has a reputation for

increasing milk flow in women, because of its milky latex, and is used for other female complaints as well as diseases of the respiratory tract. The plant has been reported as increase in urine output, antidiarrheal, antispasmodic, anti-inflammatory, Antifungal, antibacterial, analgesic, antioxidant, antiasthmatic, antitumor, antimalarial, larvicidal. The review aims at describing the botanical description, phytochemical profile of plant.

KEYWORDS: Phytochemistry, Pharmacological aspects, *Euphorbia hirta* Linn.

INTRODUCTION

Euphorbia hirta L. is a medicinal, rhizomatous herb distributed in Southern Western Ghats of India and Northern East Coast of Tamil Nadu.^[1] In East and West Africa extracts of the plant are used in treatment of asthma and respiratory tract inflammations. It is also used for coughs, chronic bronchitis and other pulmonary disorders in Malagasy. The plant is also widely used in Angola against diarrhea and dysentery, especially amoebic dysentery. In Nigeria extracts

or exudates of the plant are used as ear drops and in the treatment of boils, sore and promoting wound healing.^[2]

VERNACULAR NAME

1. Gujarati: dudeli.
2. Hawaiian: kokokahiki.
3. Hindi: baridhudi, dudhghas, dudhi.
4. Indonesia: patikankebo.
5. Kinaray-a: tawa-tawa.
6. Luganda: kasandanda.
7. Nepali: dudhejhar.
8. Nigeria, Yoruba: emi-ile.
9. Sanskrit: chara, amampatchairasi.
10. Seychelles Creole: zanrober.
11. Tagalog: tawa-tawa, gatas-gatas.
12. Tamil: ammaanpachcharisi.
13. Telugu: reddivarinanabalu.
14. Twi: kaka wieadwie.
15. Urdu: laldodhak.

DESCRIPTION

Euphorbia Hirta L. Family: Euphorbiaceae

Vernacular names: dudhani, dudhi

English name: Asthma Herb, Snake Weed.

PLANT KINGDOM

Kingdom:-plante.

Clade:-angiosperms.

Clade :-eudicots.

Clade :-rosids.

Order:-malpighiales.

Family:-euphorbiaceae.

Tribe:-euphorbieae.

Sub tribe:-euphorbiinae.

Genus :-euphorbia.

BOTANICAL DISCRIPTION

A small, erect or ascending annual herb reaching up to 50 cm, with hairy stems. The leaves are opposite, elliptical, oblong or oblong-lanceolate, with a faintly toothed margin and darker on the upper surface. The flowers are small, numerous and crowded together in dense cymes about 1 cm in diameter. The fruits are yellow, three-celled, 1-2 mm in diameter, containing three brown, four-sided, angular, wrinkled seeds.

Parts used: leaves, stem, flowers.^[3]



Fig.1: Leaves Of *Euphorbia Hirta* L. Family: Euphorbiaceae.

PHYTOCHEMICAL COMPONETS

The aerial parts of plant are well investigated for chemical information.^[4]

1. Flavonoids: Euphorbianin, leucocyanidol, camphol, quercitrin and quercitol.^[5,6]
2. Polyphenols: Gallic acid, myricitrin, 3,4-di-O-galloylquinic acid, 2,4,6-tri-O-galloyl-Dglucose. 1,2,3,4,6-penta-O-galloyl- β -D-glucose^[7,8]
3. Tannins: Euphorbins A, B, C, D, E.^[9]
4. Triterpenes and phytosterols: β -Amyrin, 24-methylenecy^[10]
5. Alkanes: Heptacosane, n-nonacosane and others.^[11]

Table 1: List of Pharmacological Activities of *Euphorbia Hirta* L. Family: Euphorbiaceae.

Sr. No.	Name Of Plant	Part Of Used	Extract	Activity	Dose	Inducing Agent	Animal Use	Chemicals	Reference
1	Euphorbia hirta	Aerial part	n-hexane	Anti – inflammatory, analgesic, antipyretic	-	Actate induce ear	Mice	Triterpense, beta-amyrin, 24-methylencycloartenol, beta-sitostrol	[12]
2		Whole dried plant	Lyophilized aqueous	Sedative and anxiolytic	1)high dose(100mg/kg &more) 2)lower dose (12. 5&25mg of dried plant /kg	-	Mice	-	[13]
3		Whole plant	Lyophilized aq.	antidiarrhoeal	50mg/kg against castor oil	Castor oil, arachodonic acid &prostaglandin E, quercitrin.	Mice	Flavonoids, glycosides part aglycone PGE2	[14, 15]
4		Leaf	Water, ethanol	Diuretic	50&100 mg/kg	Acetazolamide	Rat	furosamide	[16]
5		Whole plant	Ethanol, CH ₂ Cl ₂	Antimalarial	100-400mg/lg/day	-	Mice	-	[17]
6		Whole plant	polyphonolic	Antiamoebic& antispasmodic	Cocn. of 80 µg/ml &less conc. 10 pg/ml	Actylcholine	Guinea pig ileum	KCl	[18]
7		Whole plant	Ethanol	Antiplasmodial	-	-	-	Terpene, flavonoids, steorial, phenolic acid, xanthans, anthraquinones	[19]
8		Steambar k & leaf	Aq, leaf	Molluscicidal	1). stem bark-sub lethal dose (40%& 80 % of lc50) 2)leaf –p<0. 05		Vector snail Lymnea acuminta	Protein, nuclic acid, free amino acid, alkaline phosphate	[20]

9		Aerial plant	Ethanolic	Antimicrobial	-	-	Bacteria (e. coil, s. aureus)	Flavonoids	[21]
10		Leaves	Ethanolic	Antipyretic, anitallergic, antitumor	25 -50, 100 mg/kg 2 hrs before inta articular injection of Lps	-	Rat	TNF- α	[22]
11			Ethanolic	Anti anaphylactic	100-1000mg/kg	-	Rat & paw anaphylaxis in mice	TNF- α & IL-6	[23]
12		Leaves	Leaves	Antidibetic	300 mg/kg body wt. /rat /day	-	Rat	Lipid peroxides, hydroperoxide	[24]
13		Leaves	Methanolic	antioxidant		-		Diphenyl-1-picrylhydrazyl, terpenoids, alkaloids, tannins, flavonoids.	[25]

PHARMACOLOGICAL ACTIVITIES

Antibacterial activity

Antibacterial effect of compounds extracted from *Camellia sinensis* L. and the methanol extract of *Euphorbia hirta* L. were studied against dysentery causing *Shigella* spp. using the Vero cell line. The antibacterial effects of a methanol extract of *E. hirta* was demonstrated in vitro using species of *Shigella*. The extract was non-cytotoxic and antibacterial.^[26]

Anticancer activity

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 cytopathic dose of the pathogen. These extracts were found to be non-cytotoxic and effective antibacterial agents. Extracts of *Euphorbia hirta* have been found to show selective cytotoxicity against several cancer cell lines. The plant is useful in effective treatment of cancers, particularly malignant melanomas and squamous cell carcinomas.^[27]

Aflatoxin inhibition activity

An aqueous extract significantly inhibited aflatoxin production on rice, wheat, maize and groundnut. Anti-platelet aggregation and anti-inflammatory: Aqueous extracts of *Euphorbia hirta* strongly reduced the release of prostaglandins I₂, E₂, and D₂. Additionally *Euphorbia hirta* extracts exerted an inhibitory effect on platelet aggregation and depressed the formation of carrageenin induced rat paw oedema.^[28]

Immunomodulatory activity

Aqueous alcoholic extract containing flavonoids, polyphenols, sterols and terpenes, demonstrated immunostimulant activity. The aqueous extract affected lectin-induced lymphoblast transformation in vitro.^[29]

Antifungal activity

An ethanolic extract displayed antifungal activity when tested against the plant pathogens *Colletotrichum capsici*, *Fusarium pallidoroseum*, *Botryodiplodia theobromae*, *Alternaria alternata*, *Penicillium citrinum*, *Phomopsis caricae-papayae* and *Aspergillus niger* using the paper disc diffusion technique.^[30]

Larvicidal activity

Larvicidal activity of ethyl acetate, butanol, and petroleum ether extracts of Euphorbiaceae plants, *Euphorbia hirta*, was tested against the early fourth instar larvae of *Aedes aegypti* L. and *Culex quinquefasciatus* (Say). The larval mortality was observed after 24 h of exposure. The LC₅₀ value of petroleum ether extract of *E. hirta*, was 272.36 ppm against *A. aegypti* and 424.94 against *C. quinquefasciatus*.^[31]

Antibacterial activity

Euphorbia hirta L., Seem, for potential antibacterial activity against 5 medically important bacterial strains, namely *Bacillus subtilis* ATCC6633, *Staphylococcus epidermidis* ATCC12228, *Pseudomonas pseudoalcaligenes* ATCC17440, *Proteus vulgaris* NCTC8313 and *Salmonella typhimurium* ATCC23564. The antibacterial activity of aqueous and methanol extracts was determined by agar disk diffusion and agar well diffusion method. The methanol extracts were more active than the aqueous extracts. The plant extracts were more active against Gram-positive bacteria than against Gram-negative bacteria. The most susceptible bacteria were *B. subtilis*, followed by *S. epidermidis*, while the most resistant bacteria were *P. vulgaris*, followed by *S. Typhimurium*.^[32]

CONCLUSION

Herbal drug which are used in various traditional medicine, needs detailed investigation with ethno-pharmacological approach. In the present review we have made to explore the all details of the *euphorbia hirta* information its botany, traditional and modern uses, it is commonly found as weed on way side and at waste places through out India. Further studies going on the plant to elaborate the more activity in plant constitutes, therefore there are many plant uses are mentioned in ayurveda on that base go for further studies.

REFERENCES

1. A. Abdul Rahuman, Geetha Gopalakrishnan, P. Venkatesan and Kannappan Geetha, Larvicidal activity of some Euphorbiaceae plant extracts against *Aedes aegypti* and *Culex quinquefasciatus* (Diptera: Culicidae), *Parasitology Research*, 2007; 839-6.
2. C. Chika Ogueke, N.Jude, Ifeanyi C. Okoli And Beatrice N Anyanwu, Antibacterial Activities And Toxicological Potentials Of Crude Ethanolic Extracts Of *Euphorbia hirta*, *Journal of American Science*, 2007; 3(3): 11-16.

3. Sandeep B. Patel *, Nilofar Naikwade, Chandrakant S. Magdum Review on Phytochemistry and Pharmacological Aspects of *Euphorbia hirta* Linn.
4. D. R. Gupta A chemical examination of *Euphorbia hirta* Linn., Bull Chem Soc Jpn, 1966; 39(11): 2532-4.
5. P. Blanc, P. Bertrand, G. De saqui-Sannes Flavonoids of *Euphorbia hirta*. Plantes Med. Phytother, 1972; 6: 106-109.
6. M. Aqil Euphorbianin, a new glycoside from *Euphorbia hirta* Linn. Global Journal of Pure and applied science, 1999; 5(3): 371.
7. L. Chen. Zhongguo Zhong Yao Za Zhi. Polyphenols from leaves of *Euphorbia hirta* Linn, 1991 jan; 16(1): 38-9.
8. T. Yoshida, L Chen, Tannins and related polyphenols of euphorbiaceous plants IV. Euphorbins A and B, novel dimeric dehydroellagitannins from *euphorbia hirta* L. Chemical and Pharmaceutical bullet in, 1988; 36(8): 2940.
9. T. Yoshida, O. Namba T. Okuda, Tennen Yuki Kagobutsu Toronkai Koen Yoshishu Hydrolysable tannin oligomers from euphorbiaceae, 1989; 31: 601.
10. V. Martinz, Antiinflammatory compounds from the n hexane extract of *euphorbia hirta*, Reviews sociedad Quimica De mexico, 1999; 43: 103.
11. S. Gnecco Distribution pattern of n-alkanes in Chilean species from the Euphorbiaceae family. Boletin de la Sociedad Chilena de Quimica, 1996; 41(3): 229.
12. M.C. Lanhers, J. Fleurentin, P. Cabalion, P. Dorfman, J.M. Pelt. Dorfman P, Mortier F. Analgesic, antipyretic and anti-inflammatory properties of *Euphorbia hirta*. Planta Medica, 1991; 57(3): 225-31.
13. M.C. Lanhers, J. Fleurentin, P. Cabalion, A. Rolland, P. Dorfman, R. Misslin, J.M. Pelt. Behavioral effects of *Euphorbia hirta* L.: sedative and anxiolytic properties. J Ethnopharmacol, 1990; 29(2): 189-98.
14. J. Galvez, A. Zarzuelo, M.E. Crespo, J. Jimenez Antidiarrhoeic activity of quercitrin in mice and rats. J Pharm Pharmacol, 1993; 45(2): 157-9.
15. J. Galvez, A. Zarzuelo, M.E. Crespo, M.D. Lorente, M.A. Ocete, J. Jimenez Antidiarrhoeic activity of *Euphorbia hirta* extract and isolation of an active flavonoid constituent. Planta Medica, 1993; 59(4): 333-6.
16. P. B. Johnson et al *Euphorbia hirta* leaf extracts increase urine output and electrolytes in rats, Journal of Ethnopharmacology, 1999; 65: 63–69.
17. L. Tona, R.K. Cimanga, K. Mesia, C.T. Musuamba, T. De Bruyne, S. Apers, N. Hernans, S. Van Miert, L. Pieters, J. Totte, A.J. Vlietinck. Antimalarial activity of 20 crude extracts

- from nine African medicinal plants used in Kinshasa, Congo. *J Ethnopharmacol*, 1999; 68(1-3): 193-203.
18. L. Tona, R.K. Cimanga, K. Mesia, C.T. Musuamba, T. De Bruyne, S. Apers, N. Hernans, S. Van Miert, L. Pieters, J. Totte, A.J. Vlietinck. Antiamoebic and spasmolytic activities of extracts from some antidiarrhoeal traditional preparations used in Kinshasa, Congo. *Phytomedicine*, 2000; 7(1): 31-8.
19. L. Tona, R.K. Cimanga, K. Mesia, C.T. Musuamba, T. De Bruyne, S. Apers, N. Hernans, S. Van Miert, L. Pieters, J. Totte, A.J. Vlietinck. In vitro antiplasmodial activity of extracts and fractions from seven medicinal plants used in the Democratic Republic of Congo. *J Ethnopharmacol*, 2004; 93(1): 27-32.
20. S.K. Singh, R.P. Yadav, S. Tiwari, A. Singh Toxic effect of stem bark and leaf of *Euphorbia hirta* plant against freshwater vector snail *Lymnaea acuminata*. *Chemosphere*, 2005; 59(2): 263-70.
21. G.S. Kumar, Antimicrobial effects of Indian medicinal plants against acne inducing bacteria, *Tropical Journal of Pharmaceutical Research*, 2007; 6(2): 717-723.
22. S. f. ahmad, s. bani, p.sultan, s.a. ali, s. a.bakheet, s. m. attia TNF α inflammatory effect of *E. hirta* in rat *J. of pharmaceutical research*, 411-417.
23. Youssouf M S. Anti-anaphylactic effect of *Euphorbia hirta*. *Fitoterapia*, 2007; 78: 535-539.
24. S.P Subramanian, P. G. bhuvaneshwars antidibetic antioxidant potentials of *E.hirta* leaves extract studied in streptozotocin induced experimental diabetes in rats. *General physiological and biophysics* 10.4149/9 pb 2011 03 278.
25. A.A. Basma, z. zutaria, l.Y. latha, sreenivasan sasidharal antioxidant activity and phytochemical screening of methanol extract of *E.hirta* L. *asian pacific journal of tropical medicine elisevier*, may 2011; 4(5): b386-390.
26. K. Vijaya, S. Ananthan, R. Nalini. Antibacterial effect of theaflavin, polyphenon 60 (*Camellia sinensis*) and *Euphorbia hirta* on *Shigella* spp a cell culture study. *J Ethnopharmacol*, 1995; 49(2): 115-8.
27. K. Vijaya, S. Ananthan, R. Nalini. Antibacterial anticancers effect of theaflavin, polyphenon 60 (*Camellia sinensis*) and *Euphorbia hirta* on *Shigella* spp a cell culture study. *J Ethnopharmacol*, 1995; 49(2): 115-8.
28. P. Singh, K.K. Sinha, Inhibition of aflatoxin production on some agricultural commodities through aqueous plant extracts. *Journal of Indian botanical society*, 1986; 65(1): 30.

29. T. Szenasi E (Hung) E.Hirta extracts as Immunostimulants. German Patent DE 4102054 (1992).
30. S. Mohamed, S. Saka, S.H. EL-Sharkawy, A.M. Ali, S. Muid Antimycotic screening of 58 Malaysian plants against plant pathogens, Pesticide science, 1996; 47(3): 259.
31. A. A. Rahuman, G. Gopalakrishnan, P. Venkatesan and G.Kannappan, Larvicidal activity of some Euphorbiaceae plant extracts against *Aedesaegypti* and *Culex quinquefasciatus* (Diptera: Culicidae), Parasitology Research, 2007; 839-6.
32. J. Parekh, D. Jadeja, S. Chanda, Efficacy of Aqueous and Methanol Extracts of Some Medicinal Plants for Potential Antibacterial Activity Turk J Biol, 2005; 29: 203-210.