

# A COMPREHENSIVE REVIEW ON THERAPEUTIC POTENTIAL ON EUPHORBIA HIRTA LIN

## ABSTRACT

*Euphorbia hirta* Linn, a representative of the Euphorbiaceae family, is a widespread annual herb found in wastelands in humid conditions. The plant is high in phytochemicals such as tannin, quercetin, and phytosterol, however there are few phytopharmacological investigations on it. Plant components are normally employed in traditional medicine to treat respiratory problems, gastrointestinal issues, wound healing, and other ailments. The steroid of *E. hirta* was found to have CNS depressive and muscle relaxant effects, as well as a sub-maximal anti-stress and anxiolytic impact.

**Keywords-** *Euphorbia hirta* Linn, Euphorbiaceae, Anxiolytic, Muscle relaxant, CNS depressive, Phytosterol, Phytomedicine.

## 1. INTRODUCTION

People of all age, According to World Health Organisation (WHO) mood disorder will be the second most major cause of ailment by 2023. Depression is characterised by a change in mood, a lack of interest in the surroundings, psychomotor slowness, and melancholia, and is classified as an affective illness. The frequency of depression in the general population is believed to be around 5% worldwide (1).

Stress disorders are the most prevalent psychiatric diagnosis in several segments of the population, and they affect about 10% to 30% of the general population. Herbal products are becoming increasingly renowned (2). Ayurveda mentions a variety of single and compound medication compositions of plant origin that are used in the treatment of psychiatric disorders (3). Cannabis, bhrami, opium, ephedra, pilocarpus, physostigma, belladonna, datura, coffee, nux-vomica, hyoscyamus, and lobelia are only a few examples of herbal medications with powerful CNS activity (4) Lanhers et al., 1996 investigated the benzodiazepine-like characteristics, neuroleptic, hypnotic, and antidepressant activities of a lyophilized aqueous extract of *Euphorbia hirta* L. (Eh). The results revealed that the aqueous extract does not appear to have benzodiazepine-like neuroleptic hypnotic effects.

The plant extract had a direct effect on the central nervous system as well as a mild depressive effect. [5] Comprehensive knowledge and information on Euphorbia are included in this review for exploring the therapeutic approach of this plant by knowing its use in various medical ailments.

## **PHARMACOGNOSY OF EUPHORBIA HIRTA**

### **TAXONOMICAL CLASSIFICATION OF EUPHORBIA HIRTA**

**Kingdom** – Plantae

**Division** – Tracheophyta

**Class** – Magnoliopsida

**Order** – Malpighiales

**Family** – Euphorbiaceae

**Genus** – Euphorbia

**Species** – Euphorbia hirta

**Botanical Name** – Euphorbia Hirta Linn.

**Common Name** – Asthama Plant (English), Borokeruie (Bengali)

**Synonyms** – Euphorbia capitata Lam, Euphorbia pilulifera, Chamaesyce hirta (L.)

### **Morphology**

Euphorbia hirta Linn, often known as Dudhi, is an annual herb that can be found in wastelands, along wall sides, and along roadsides in humid conditions. Its stem is smooth, slender, densely branched, and reddish in colour, with delicate adventitious roots emerging from nodes. From June to November, the roots are thin, fibrous, and sensitive. Flowering takes place (6)

E. hirta is a member of the Euphorbia genus, which has a wide range of therapeutic applications. Sweet, bitter, thermogenic, acrid, diuretic, and laxative are all characteristics of the plant. The herb has been used as an antibiotic to treat dermatitis, snakebite, ringworms, skin irritation, and eczema since ancient times. Because the seeds and leaves are used to treat bowel disorders in youngsters, they are classified as stimulant laxatives. Antimicrobial and antiviral properties have been documented for E. hirta Linn. Essential oil, quercetin, phytosterols, and tannins are all said to be present in the plant [7]. So far, no significant research has

been done on the plant's therapeutic potential. As a result, the current study will look at the CNS activity profile of the separated phytosterol fraction. *Euphorbia hirta* is a widespread herb found around the world, including Phillipines, Australia's Northern Territory, Africa Queensland, New South Wales, Indonesia, Central America, the Western Australia, India, and China. Originally from Central America. It is usually found standing up, reaching a height of 40cm, although it can also be found resting down, measuring roughly 1-2.5 cm in length. [8].



Pic i) Whole Plant

Pic ii) Stem

Pic iii) Roots



Pic iv) Inflorescence

i) **Flowers** - Male flowers are sessile, with linear bracteoles, solitary stamen, are fringed, and lack a perianth. Female flowers have a short pedicel, superior ovary, ringed perianth, three styles, three-celled, minute, and two-fid apex hairs.

ii) **Inflorescence** – Cyathium, a cyme made up of many cyathia firmly crowded together.

iii) **Fruits** – Three brown, four-sided, angular, wrinkled seeds, base truncate, hairy, 1-2mm in diameter, contained in yellow, three lobed, three seeded, keeled capsules [9, 10, 11].

iv) **Seeds:** Oblong, four-sided, pinkish brown, without caruncle, slightly wrinkled.

v) **Stems** - Small, glabrous, hairy stems & possesses 2-3 internodes.

vi) **Roots** – The roots of the plant are arranged in a taproot system manner.

#### **Chemical constituents**

Many scholars have explored *E. hirta*, and a number of active components have been found. The methanolic extract of *E. hirta* was used to isolate quercitrin, Afzelin, and myricitrin. [12] Quercitin, rutin, 2, 4, 6-tri-O-galloyl—d-glucose, euphorbin-A, euphorbin-B, euphorbin-C, euphorbin-D, 1, 3, 4, 6-tetra-O-galloyl—d-glucose, kaempferol, protocatechuic acid, and gallic acid have all been recovered from *E. hirta* [13 and 14] *E. hirta* also contains tinyatoxin, choline, shikmic acid, quercitol, and camphol derivatives comprising chtolphenolic acid and rhamnose [16], as well as 24-methylenecycloartenol, -amyrin, -sitosterol, nonacosane, heptacosane [15], tinyatoxin, choline, shikmic acid, quercitol and camphol derivatives containing chtolphenolic acid and rhamnose [16].

#### **Traditional Uses**

The plant is used to treat a variety of ailments, including respiratory diseases (cough, cold, asthma, bronchitis, hay fever, emphysema), gastro intestinal disorders (constipation, dysentery, bowel complaints, digestive problems), genital apparatus (metrorrhagic, agalactosis, gonorrhoea, urethritis), urinary apparatus (diuretic, urethritis), and In South India, it's utilised for ear drops as well as the treatment of boils and ulcers. [22]. The therapeutic uses of the plant are mentioned below, classified by plant part and kind of extract, for a variety of medical conditions.

#### **Table 1. Therapeutic Use of plant extract**

S.no	Plant part & extract used	Therapeutic Use	Reference
1.	Aqueous extract of leaves	Anti-diarrheal, Spasmogenic, Anti-amoebiasis	Hore <i>et al.</i> , 2006
2.	Methanol, chloroform, ethanol, Petroleum & ether extract of fruits	Anti-inflammatory	Mei-Fen Shih <i>et al.</i> , 2010
3.	Aqueous & ethanolic extract of leaves	Anti-diuretic	
4.	Aqueous & methanolic extract of whole plant	Anti-oxidant	Abu <i>et.al</i> ; 2011
5.	Ethanolic & ethyl acetate extract of whole plant & of fruits	Anti-diabetic	Kumar <i>et al.</i> (2010)
6.	Lyophilised extract of whole plant	Anti-thrombocytopenic	Joveneio <i>et.al</i> ; 2012
7.	Aqueous & methanolic decoction of leaves	Anti-viral	Agnes <i>et.al</i> ; 2009
8.	Aqueous extract of whole plant	Anthelmintic, Molluscicidal and Larvicidal	Preeti <i>et al</i> ; 2009
9.	Dried whole plant powder	Galactogenic	Blanc <i>et.al</i> ; 1964
10.	Hydroalcoholic decoction of whole plant	Hepatoprotective	Tiwari <i>et.al</i> ; 2015

**Table 1. Pharmacological activities based on evidences**

### **Anti-inflammatory properties**

Mei-Fen Shih *et al.* (2010) evaluated the anti-inflammatory properties of an ethanol extract of *Euphorbia hirta* (Eh) and its active component -amyrin in LPS-activated macrophage cells (RAW 264.7). iNOS gene expression and nitric oxide (NO) creation were both reduced by the extract and active component. As a result, *Euphorbia hirta* and -amyrin could be used to treat arthritis inflammation [23].

### **Anti-diabetic effects**

Kumar et al. (2010) investigated the anti-diabetic effect of *Euphorbia hirta* leaf, stem, and flower ethanolic extracts (250 and 500 mg/kg) in normal and streptozotocin-induced diabetic mice. The extracts were taken orally for 21 days and showed a significant reduction in blood glucose levels. *E. hirta* was found to have anti-diabetic properties in the study. [24]

### **Anti-tumour activity**

A cyclopentanone derivative (1'R,5'R)-5-(5'-carboxymethyl-2'-oxocyclopentyl)-3Z-pentenyl acetate was obtained from *Euphorbia hirta* by Shao-Ming Chi et al. in 2012. The structure was determined using spectroscopic analysis and 1D and 2D NMR. A549 (lung cancer) and K562 (human leukaemia) cell lines were used to test the cytotoxicity of ethanol extract. The ethanol extract had a poor action against A549 cells (inhibition ratio 15.02 11.60 percent) and was inert against K562 cells, according to the data[25].

### **Anti-depressant activity**

Lanthers et al., 1996 assessed the benzodiazepine-like characteristics, neuroleptic, hypnotic, and antidepressant activities of a lyophilized aqueous extract of *Euphorbia hirta* L. (Eh). The results revealed that the aqueous extract does not appear to have benzodiazepine-like neuroleptic hypnotic effects. The plant extract had a direct effect on the central nervous system as well as a mild depressive effect. [5]

### **GI tract**

Hore et al. (2006) analyzed gastrointestinal motility in rats and mice. According to the findings, aqueous leaf extract reduced gastrointestinal motility in rats and Castrol oil-induced diarrhoea in mice in a dose-dependent and substantial manner. These findings backed up the usage of *Euphorbia hirta* for diarrhoea in the past [27].

### **Anti-microbial & anti-fungal**

Ghosh et al. assessed the antimicrobial activities of an ethanol extract of *Euphorbia hirta* against the growth of *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*.

### **Immunomodulatory**

Ping et al. (2012) investigated the effect of a plant methanolic extract, which was found to have 45 percent immunomodulation characteristics by preventing NO generation. The methanolic extract of *Euphorbia hirta* (1 mg/ml) has outstanding mutagenic and mitodepressive effects.

### **Anti-allergic, anti – anaphylactic**

Yossouf et al., 2007; and Singh et al., 2006. *Euphorbia hirta* ethanol extract was found to have antianaphylactic effects. In a study, the herb was found to prevent passive cutaneous anaphylaxis in rats and active paw anaphylaxis in mice.

### **Anxiolytic & sedative**

The hydroalcoholic extract of the plant was tested for anxiolytic effects in chronically stressed rats by Anuradha et al. (2008) and Lanhers et al. (1990). The findings show that *Euphorbia hirta* has anxiolytic properties, particularly in CIS-induced anxiety.

### **Anti-oxidant**

Abu et al. (2011) investigated the anti-oxidant properties of plant extracts from various sections of the plant and found that leaves extract had the highest DPPH scavenging activity of 72 percent, followed by the scavenging effects of the other plant parts.

### **Antiasthmatic**

Ekpo et al. (2007) explored the role of plant extract in asthmatic mice and found that the findings were positive when compared to the ultrastructure of fibrin networks and platelets in control animals.

## Anticancer

Patil et al. (2011) investigated the cytotoxicity of *Euphorbia hirta* in a brine shrimp lethality test and found that the LC50 of ethyl acetate and acetone decoction of plant parts, respectively, were 71.15 and 92.15 g/ml.

**Table 2. list of research on antiviral and antibacterial activities**

S.no	Activities	Reference
1.	Anti-inflammatory	Mei-Fen Shih <i>et al.</i> , 2010
2.	Anti-diabetic	Kumar et al. (2010)
3.	Anti-tumor	Shao-Ming Chi et al., 2012
4.	Anti-depressant	Lanhers et al., 1996
5.	Anti-diahearral	Hore <i>et al.</i> , 2006
6.	Anti-microbial - antifungal	Ghosh et al;
7.	Immunomodulatory	Ping et. al; 2012
8.	Anti-allergic, anti – anaphylactic	Yossouf et.al; 2007 & Singh et.al; 2006
9.	Anxiolytic & sedative	Anuradha et.al; 2008 & Lanhers et.al; 1990
10.	Anti-oxidant	Abu et.al; 2011
11.	Antiasthamatic	Ekpo et.al. 2007
12.	Anticancer	Patil et.al 2011

## Conclusion-

In this review of *E.hirta* a detailed description of morphological account, chemical constituents, it's traditional uses and potential for showing various activities like anti-inflammatory, anti-diabetic, anti-tumor, anti-depressant, anti-diahearral, anti-microbial, antifungal, immunomodulatory, anti-allergic, anti-anaphylactic, anxiolytic & sedative, anti-oxidant, antiasthamatic, anticancer were described. Further research should be carried in support with this to explore the new avenues of it,.

## NOTE:

**The study highlights the efficacy of "herbal medication" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.**

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