

# A Review on Euphorbia Hirta Linn

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**Abstract-** *Plants in the world are God-gifted natural amenity. Medicinal plants are the inception of medicinal compounds. Herbs have wide range of definitions and are used in traditional Indian system of medicine. Herbal medicines are used to treat root cause of ailment and treat skin diseases. The concentration of the extract needed to trap 50% of DPPH (IC50) was 0.205 mg/ml. lipopolysaccharide-induced raw 264.7 macrophages were used to test the E. hirta extract's anti-inflammatory properties. In the presence of 200 mg/ml E. hirta extract, the anti-inflammatory activity was greatest, and nitric oxide production significantly decreased (p 0.05). At a concentration of 100mg/ml, the extract also demonstrated selective anticancer activity (p0.05). according to these findings, E. hirta may require additional develop to herbal medications that are antioxidant, anti-inflammatory and anti-cancer activity.*

**Keywords-** Euphorbia hirtaLinn, botanical description, phytochemistry, pharmacological activities.

## I. INTRODUCTION

Plants in the world are God-gifted natural amenity<sup>11</sup>. man's quiddity on this earth has been made doable only because of the foremost role played by the plant kingdom. The variety of living organisms that makes up the sphere of plants life on our planet. The three germane requisite of life food, clothing and shelter<sup>12</sup>. Medicinal plants are the inception of medicinal compounds play a preponderant in the perpetuation of human health from since obsolete aeon of yore. It is virtually extended to a moment of not only consumption but also annihilation<sup>13</sup>. Herbs has wide range of definitions. from a botanist point of view, herb is a short-lived plant or a perennial, biennial or annual plant which doesn't have woody tissue<sup>14</sup>. It is usually leafy greens, flowing parts, fresh or dried species produced from the berries, Roots, barks, seeds, fruits. These are used as food, flavouring medicine, fragrances due to their aromatic properties<sup>15</sup>. In developed and developing countries herbal medicines has increased significantly by the people interest for mainstay of their primary health care needs<sup>16</sup>. Herbal medicine refers to the usage of herbal plant parts like flower, stems, leaves or a whole plant to re-establish health and maintenance of balance. Herbal medicine has the property to go deeper into the body to treat root cause of ailment because herbs synthesize a wide variety of

phytoconstituent like alkaloids, glycosides, steroids, etc. These constituents when consumed in appropriate amounts has beneficial effects on long term use<sup>14</sup>. Herbal preparations are produced from herbal raw materials by physical or biological processes. This process may be extraction, fractionation, purification, concentration, fermentation and other processes. they also include processing herbal materials with a natural vehicle or heating them in alcoholic beverages or honey or in other materials. The resulting herbal preparations include simply fragmented or powdered herbal material as well as extracts, tinctures, fatty or essential oil expressed plant juices, decoction, cold and hot infusions. Herbal medicinal product consists of one or more herbs it contains excipients in addition to the active ingredients<sup>15</sup>. Traditional system of medicine plays an important role in an Indian origin or which has been come to India from outside and got incorporated into Indian culture are known as Indian system of medicine<sup>13</sup>. Traditional Indian system of medicine ayurveda, Unani, Siddha system are based on the use of plants and other natural substances<sup>17</sup>. Traditional medicine is the knowledge, skills and practices based on the theories and experiences indigenous to different cultures used in the maintenance of health and in the prevention, diagnosis, improvement or treatment of physical and mental illness. The most common reason for using traditional medicine is more affordable than the allopathy medicine<sup>18</sup>. The novel drug system said that folk medicine and systemic screening of them result in the discovery of new novel effective compounds<sup>19</sup>. Herbal drug technology was aimed to provide the knowledge of herbal drug and their industrial production of commercial application for the benefit of the society<sup>13</sup>. So that the nature as provided a complete store-house of remedies to cure all ailments of mankind. In the past decades, natural products play a vital role in the cure of diseases<sup>20</sup>.

Euphorbia genus is one of the largest Euphorbiaceae family of the "giant genera "of flowering plants with over 2000 currently recognized species from annuals to trees<sup>3,21</sup>. It is also called spurge family consisting of about 322genera and 8910species.It is the world sixth largest family<sup>2</sup>. There are mostly originated from Africa or Madagascar. Ninety-one species of euphorbia grow in turkey or spurge in English are used in traditionally medicine to treat skin diseases<sup>21</sup>.



Fig 1: *Euphorbia hirta* Linn

## II. TAXONOMICAL CLASSIFICATION<sub>5</sub>

Botanical Name: *Euphorbia hirta* Linn.

Kingdom: Plantae  
 Subkingdom: viridaplantae  
 Infrakingdom: straptophyta  
 Division: Tracheophyte  
 Subdivision: spermatophyte  
 Infradivision: angiosperms  
 Phylum: Magnoliophyte  
 Class: Magnoliopsida  
 Order: Malpighiales  
 Suborder: Rosanae  
 Family: Euphorbiaceae  
 Genus: Euphorbia  
 Species: hirta

### • Synonym

*Euphorbia capitata* Lam., *Euphorbia pilulifera* Jacq.,  
*Chamaesycehirta* (L.)

### • Vernacular names:

#### A. INDIAN NAMES<sub>1,5</sub>

Assam -Gakhiroti bon  
 Bengali -Barokarni  
 English-Asthma herb  
 Hindi -Dudhi  
 Irula -Pacchaikuthuchedi  
 Kannada -Akkigida  
 Konkani -Dudurali  
 Malayalam -kuzhinagappala  
 Manipuri -Pakhambamaton  
 Marathi -Dudhi  
 Tamil -Amman pacharisi

Telugu -Nanapala  
 Rajasthani -Dhedhi-dudheli  
 Sanskrit-ksira

#### B. INTERATIONAL SYNONYM<sub>1,5</sub>

*Euphorbia hirta* has many local names in different countries such as

Arab: Labeinah  
 Australia: Asthma herb  
 Bangladesh: BoroKerue  
 China: Feiyangcao  
 English: Asthma plant, bearing spurge, snakeweed  
 French: Euphorbeafléusentete  
 India: Dudhi  
 Indonesia: Daunbijikacang  
 Japan: GelangSusu  
 Laos: Mouk may  
 Liberia: Tuagbono  
 Malaysia: Ambinjantan  
 Malay: Moluccas  
 New Britain: Gunantuna  
 Norway: Dembasindji  
 Papua New Guinea: Sip  
 Philippines: Butobutonis  
 Sundan: Nanangkaan  
 Thailand: Nam nom raatchasee  
 Vietnam: Corsuwra  
 West Bengal: Borokerue.

- **Duration:** Annual<sub>4</sub>.
- **Growth Habit:** The plant is a pan tropical weed, found especially on roadsides and wasteland<sub>22</sub>.
- **Distribution:** Anywhere temperatures are warm for seed germination, found widespread at low altitudes throughout the tropics and sub tropics<sub>4</sub>.
- **Dimensions:** Height: 1 ft. 0 in. – 2 ft. 0 in. Width: 1 ft. 0 in. – 2 ft. 0 in<sub>2</sub>.
- **Growth rate:** Rapid.
- **Maintenance:** Low.
- **Texture:** Medium.
- **Light:** Full sun (6 or more hours of direct sunlight a day). Partial shade (direct sunlight only part of the day, 2-6 hours)
- **NC Region:** coastal, mountains, piedmont.

### III. BOTANICAL DESCRIPTION

A small, erect or ascending annual herb reaching up to 50 cm in height, reddish or purple, with abundant latex and is hairy<sup>1</sup>.

- **LEAVES:**

The leaves are opposite, distichously, and simple stipules are linear. The leaf blades are lanceolate-oblong, serrated, long elliptic, or obovate or ovate-lanceolate; its base is very dissimilar or unequal; one side is cuneate, the other side is obliquely rounded; the apex is acute, length is 3-4 cm and width is 1-1.4 cm and its margins are smooth toothed, sometimes with a purple blotch near the midrib<sup>1</sup>.



Fig2: *Euphorbia hirta* leaves

- **FLOWER:**

The flowers are small, numerous and crowded together in dense cymes about 1 cm in diameter<sup>2</sup>. The inflorescence of *euphorbia hirta* has a monoecious, terminal or auxiliary cluster of flowers, called a 'cyathium', and with several cyathium finely arranged into a cyme. The male and the female flowers are condensed in one involucre and both apetalite. The flowers are unisexual; the male flowers are sessile, bracteoles are linear, fringed, the perianth is absent, and possesses one-stamen, the female flowers have small pedicel, the perianth is rimmed, the ovary is superior, covered with minute hairs, 3-celled, possesses 3-styles, small, and the apex is 2-fold. Flowering duration is usually throughout the year<sup>1</sup>.



Fig 3: *euphorbia hirta* flower

- **STEM:**

The stems are small glabrous, hairy and long with monopodial branching pattern<sup>1</sup>. It is erected, cylindrical and reddish or green in appearance and grows up to 10-75cm long. Internodes are 2.5 to 3cm in length stipules present, covered with pubescent. The nodes are a bit thickened characterized by the presence of small membranous linear stipules that shed off at early stages<sup>3</sup>.



Fig 4: *euphorbia hirta* stem

- **FRUIT:**

The fruits are yellow, three-celled, hairy, keeled capsules, 1-2 mm in diameter. *Euphorbia hirta* has allomorphic pistillate fruits<sup>4</sup>. The fruit is exerted, 3-lobed, base truncate, covered with short hairs. The seeds are oblong, 4-sided prismatic, wrinkled and brownish pink, 3- seeded capsule; it is green and covered with fleshy prickles, seed smooth, hard, mottle crustaceous Testa with a white caruncle at the top enclosing oily endosperm<sup>1</sup>.



Fig 5: *euphorbia hirta* fruit

- **ROOTS:**

It has a distinct and developed primary root i.e., tap root system<sup>1</sup>, growing positively geotropic. primary root is enlarged, dominant, distinct at the stem base, it is cylindrical

in shape. The lateral roots like secondary roots and tertiary roots are arising and spreads below the ground.<sup>2</sup>



Fig 6: *euphorbia hirta* root

#### IV. ETHNOPHARMACOLOGY:

##### Traditional and modern usage:

It is used to treat worm infestations in India. It is mainly used in children for the treatments of dysentery, jaundice, gonorrhoea, digestive problems, and most importantly used in the treatment of respiratory ailments, especially cough, bronchitis, asthma also for acne, pimples, cancer and tumours<sup>22</sup>.

##### Ethnoveterinary usage:

The fresh milky latex from the plant 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<sup>22</sup>.

#### V. PHYTOCHEMISTRY

Phytochemistry is also known as plant chemistry. In Greek words “Phyto” means “plant”. It is the branch of chemistry, deals with chemical nature of the plant or chemistry of natural products. Phytotherapy is the source of improving and in the treating certain diseases by using the beneficial effects of medicinal plants<sup>6,7</sup>. Phytochemistry are the bioactive compounds or natural chemical compounds found especially in plants. The plant containing chemical compounds are significantly classified into two types, primary metabolites and secondary metabolites. Primary metabolites are involved in the processes of primary metabolites such as building and maintaining plant cell. Most of the primary metabolites are in universal occurrence. Primary metabolites are carbohydrates, chlorophyll, lipids, proteins, amino acids, etc. secondary metabolites are alkaloids, essential oils, flavonoids, tannins, terpenoids, saponins, phenolic

compounds. It is also synthesized naturally in all parts of the plant body like barks, fruits, flower, seeds, root, stem, leaves. Different species or same species of plants are grown in different location are harvested at a different time have different chemical constituents. Active constituents are also obtained from leaves, barks, seeds, roots, flowers and parts of plants with different quality and quantity. Active compounds information on the distribution is lacking. This phytochemical protects the cells of the plants from environmental hazards such as pollution, drought, UV exposure stress and pathogenic attack. It mainly includes the plant’s colour, aroma and flavour. Medicinal compounds of the plant serve as predominant source of bioactive molecules for novel therapeutic agents. In recent years, the novel therapeutic agents are used against various diseases. The synthesis of new drugs utilized the isolated bioactive molecules<sup>6</sup>. *Euphorbia hirta* contains flavonoids, terpenoids, tannins, acids, minor constituents, other compounds, phenols, essential oil<sup>1,7</sup>.

Acids - tartaric acids, ellagic, tannins, maleic, gallic, tannins.

Essential oils - major constituents are 6,10,14-trimethyl-2-pentadecanone, hexacanal, 3,7,11,15-tetramethyl-2-hexadecan-1-ol, and n-hexadecanoic acid, phytol<sup>7</sup>.

Flavonoids – quercitrin, quercetin, quercitol and derivatives such as rhamnose, myricitrin, myricyl alcohol, kaempferol, quercetinrhamnoside, chlorophenolic acid, cyaniding 3,5-diglucoside, pelargonium 3,5-diglucoside and camphol, flavonol glycoside xanthrammin, leucocyanidin, leucocianidol, hentriacontane, rutin are found in *euphorbia hirta*<sup>7</sup>.

Terpenoids – terpenoids,  $\alpha$ -amyrin,  $\beta$ -amyrin, friedelin, teraxerol and its esters-taraxerone, 24-methylene-cycloartenol, 11 $\alpha$ ,12 $\alpha$ -oxidoteraxerol, euphorbolhexacosonate, cycloartenol. Diterpene esters of phorbol type and ingenol type includes 12-deoxy phorbol – 13-phenyl acetate, 12-deoxy phorbol-13-dodecanoate-20-acetate ingenol triacetate, highly toxic tinyatoxin, resiniferonol derivative, 16- $\alpha$ , 19-dihydroxy-ent-karene, 2- $\beta$ , 12- $\alpha$ , 19-trihydroxy-ent-kaurane<sup>7</sup>.

Other isolated terpenoids are sterols, includes campesterol, cholesterol,  $\beta$ -sitosterol and stigmasterol.

Minor constituents contains 1,2-benzene dicarboxylic acid diisocylester, 2-butoxyethanol, tetradecane, phthalic acid, oleic acid, butyl tetradecyl ester, 13-hepta decyl-1-ol, 2-methyl-1-hexadecanol and other compounds- alkaloids, amino acid, saponins and minerals<sup>7</sup>.

Tannins – euphorbin A, B, C, E and terchebin, Dimeric hydrolysable dehydroellagic tannins the monomeric

hydrolysable tannins geranin, 1,2,3,4,6-penta-o-galloyl- $\beta$ -D-glucose, 2,4,6-tri-o-galloyl- $\beta$ -D-glucose and the esters 5-o-caffeoyl quinic acid and benzyl gallate, 3,4 -di-o-galloylquinic acid<sup>7</sup>.

## VI. PROXIMATE CHARACTERISTICS

*Euphorbia hirta* exhibits following proximate characteristics such as moisture content 9.84(% w\w), water-soluble extract 7.0, ethanol soluble extract 14.85, methanol soluble extract 9.71, total ash content 8.90, acid insoluble ash 7.84, water-soluble ash 1.06. the physiochemical properties of the whole plant had shown the following contents like carbohydrate of the leaves 1.5 and stems 8.0(% w\w), lipid of the leaves 25.0 and stem 14.0(% w\w), protein of the leaves 9.5 and stems 3.0(% w\w), moisture content of leaves 13.50 and stems 10.30(% w\w), ash of leaves 18.66 and stems 21.50(% w\w), acid-insoluble ash of the leaves 3.50 and stems 2.50(% w\w)<sup>1,6, 23,24,25</sup>.

## VII. ETHNOPHARMACOLOGICAL PROPERTIES

In the whole world a plant *Euphorbia hirta* is used as long-term medicinal herb. Because of its wide range of biological activities and pharmacological activities various formulations are such as decoction, juice, infusion, dried powders, crude extracts. In 1977 Chinese Pharmacopoeia recorded the *Euphorbia hirta*. The whole plant of the crude extracts used in veterinary medicine for treating gastroenteritis, diarrhoea in pig, horse, sheep, fish, cattle in folklore medicine to cure gonorrhoea and hematuria. In African pharmacopoeia *Euphorbia hirta* is used for different medications and in south Africa to treat asthma<sup>26</sup>. In Indian medicinal system, the latex from the plant of *Euphorbia hirta* is used to treat ulcers, conjunctivitis, the leaves are used in the treatment of wound healing, kidney stones, cold, fever, bowel complication, bronchial infections, syphilis. To increase the milk flow of nursing mothers *Euphorbia hirta* is used. The leaves of the plant are mixed with datura metal leaves and petals are used for preparing the asthma-cigarettes in Philippines<sup>23,5,7,26,27,28,9</sup>. It also have several pharmacological possibilities with vast pharmacological actions like anti asthmatic, antidiarrheal, anticancer, antipyretic, antioxidant, antitumour, anti-inflammatory, antifungal, antibacterial, antidiabetic, antiviral, sedative and anxiolytic, diuretic and increases electrolytes, anti-apoptotic activity, anti-venom activity, wound healing activity, immunostimulatory activity, anti-thrombocytopenic activity, genotoxic effect, sperm motility, synergistic activity, larvicidal activity, galactogenic activity, anti-fertility activity, aflatoxin inhibition activity, anti-hepatotoxic activity<sup>7,9,29</sup>.

## ANTIBACTERIAL ACTIVITY

The saponification process makes use of ethanol, methanol, acetone, and *E. hirta* that has been extracted with chloroform. The agar disc diffusion method was used to test the extracts' effectiveness against pathogens in order to investigate the plant extract's inhibitory effect on microorganisms. *Euphorbia hirta* Linn. exhibited high inhibition against the majority of the 11 pathogens tested. *Pseudomonas aeruginosa* and *Staphylococcus epidermidis* were the most susceptible of the organisms tested, while most of the extracts of *E. hirta* inhibited *Serratiamarcescens*, *Enterobactercloaceae*, *Citrobacterkoseri*, and *Citrobacterfreundii* the least. It is concluded that urological practice may incorporate updated antibiotic policies and, more importantly, the development of herbal alternatives<sup>30,31</sup>.

## ANTIOXIDANT ACTIVITY

The extract of the leaves had the highest DPPH scavenging activity—72.96.78 percent—then the extract of the flowers, roots, and stems—52.45.66 percent, 48.59.97 percent, and 44.42.94 percent, respectively. 75.130.75 percent of the total was butylated hydroxytoluene (BHT). BHT had an IC (50) of 0.803, 0.972, 0.989, 1.358, and 0.794 mg/mL for the leaves, flowers, roots, and stems, respectively<sup>30,32</sup>.

## ANTI-FUNGAL ACTIVITY

Using the agar disc diffusion method, methanolic extracts of *Euphorbia hirta* leaves, flowers, stems, and roots were compared to yeast. One yeast, *Candida albicans*, was subjected to screening. 16-29 mm wide were the inhibition zones. The fungicidal activity of the extract shows that it first inhibited yeast growth in large zones in the leaves, then in the flowers<sup>30,33</sup>.

## ANTI-INFLAMMATORY ACTIVITY

On lipopolysaccharide (LPS)-induced inflammation, the ethanolic extract of *Euphorbia hirta* L. (EH) exhibits anti-inflammatory activity. In an established model of inflammation, lipopolysaccharide (LPS)-activated macrophage cells (RAW264.7) were used to investigate the ethanolic extract of *Euphorbia hirta* L. (EH) and its active component. Using a colorimetric assay (Griess reagent), western blotting, and reverse transcription polymerase chain reaction (RT-PCR), nitric oxide (NO) production and expression of iNOS protein and mRNA were measured following activation, respectively. ELISA was used to simultaneously monitor the change in PGE (2), TNF-alpha, and IL-6 levels. According to our findings, EH exhibited a dose-dependent inhibition of

LPS-induced NO production and produced a remarkable anti-inflammatory effect at low concentrations without cytotoxicity<sup>30,34</sup>.

### ANTIMICROBIAL ACTIVITY

The antimicrobial activity of the ethanolic extracts of the aerial parts of *Euphorbia hirta* was investigated. This plant had a wide range of antimicrobial properties, particularly against *Proteus vulgaris*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Escherichia coli* (pathogen)<sup>30,35</sup>.

### ANTICANCER ACTIVITY

The chemical composition, antioxidant, anti-inflammatory, and cancer-fighting properties of *Euphorbia hirta* L. extract were discussed in another study. An online high-performance liquid chromatography (HPLC)-2, 2'-azobis (3-ethylbenzothiazoline6-sulfonic acid) assay and electron spin resonance spectrophotometric analysis of 1,1-diphenyl-2-picryl- hydrazyl (DPPH), hydroxyl, and alkyl radical levels were used to determine the antioxidant properties of the whole *E. hirta* ethanol extract. Ethanol extract of *E. hirta* at 0.5 mg/mL had a DPPH-scavenging activity of 61.19%, 0.22%, while ascorbic acid at 0.5 mg/mL had an activity of 100% 0.22%. Online HPLC analysis of the extract also revealed strong antioxidant activity. The concentration of the extract needed to trap 50% of DPPH (IC<sub>50</sub>) was 0.205 mg/ml. Lipopolysaccharide-induced RAW 264.7 macrophages were used to test the *E. hirta* extract's anti-inflammatory properties. In the presence of 200 mg/mL *E. hirta* extract, the anti-inflammatory activity was greatest, and nitric oxide production significantly decreased (p 0.05). At a concentration of 100 g/mL, the extract also demonstrated selective anticancer activity (p 0.05). According to these findings, *E. hirta* may require additional research to develop herbal medications that are antioxidant, anti-inflammatory, and anti-cancer<sup>30,36</sup>.

### VIII. CONCLUSION

The present study of *Euphorbia hirta* Linn reviewed that it has a wide range of potentiality for its taxonomical classification, Indian names, international synonym, botanical description, phytochemistry, ethnopharmacological properties and its therapeutic properties. This plant shows a significant nutritional source for many severe diseases in various parts of the world. The different parts of the plant *Euphorbia hirta* reveals that medicinal applications, which attract the attention of many scientists to screen on its potent medicinal agent. The extract of the plant shows several pharmacological activities. Hence the compounds from natural sources are safe for use.

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