Original Article

A Review On Pharmacological And Chemical Documentation Of Euphorbia Thymifolia

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Abstract

An conventional and mainstream medical system called Ayurveda has been a wellspring of innovative ideas and medical supplies. According to the literature, Euphorbia hirta Linn. (EH) is a medicinal herb that has been advantageously verified. Different components of this plant are used by India's rural and tribal populations to treat a variety of illnesses. By researching the plant's pharmacology in vitro and in vivo, its use in conventional medicine has been established scientifically. Multiple data base resources were used to collect the data.

Key words: Ashtma herb, Dudhia, Euphorbia hirta.

INTRODUCTION:

It has long been usual in India to treat particular disorders with the various portions of various medicinal plants. Ayurveda, Siddha, and Unani are three indigenous medical systems that have been practised for many years. Some of the main Ayurvedic remedies use plants as the primary ingredient, and some of these therapies are similar to contemporary medications (1).Though millions of people cannot afford these synthetic pharmaceuticals and they have a variety of negative effects, they are successful in treating a number of disorders. It is estimated that 70,000 different plant species have been used medicinally. Herbs are used as raw materials in the production of conventional pharmaceuticals. Compared to roughly 1400 in Sri Lanka and 700 in Nepal, more than 2500 plant species in India have been recognised as having medicinal use. This research seeks to give a general review of the chemical elements and pharmacological effects of disorders brought on by Euphorbia hirtan that are commercially accessible (2).

METHODS:

We utilised Google Scholar, Science Direct, and PubMed to look for articles for the literature review. The current review, which draws from 37 sources, provides exhaustive detail regarding the pharmacological properties and chemical constituents of this plant. They were written between December 2013 and today. Availability and habitat In the hotter regions of Australia and India, Euphorbia hirta is common in waste areas by the sides of roadways.

PLANT DESCRIPTION:

E. Thymifolia Linn.
Synonym - E. pilulifera Linn, Chamaesyce pilulifera Linn, E.hirtaFamily: Euphorbiaceae (4)

Vernacular Names:

Bengal- Barokhervi
English -bearing spurge, asthma herb, snakeweedGujarat- Dudeli
Hindi- Dudhi Nepali-Dudhia
Indonesia- Daun biji kacang Malayalam- Nelapalai Malaysia -Ambin janyan Marathi- Dudnali, govardhanOrissa- Jhotikhuntia SanskritTamil- Amumpatchaiyarissi
Telagu- ReddinanabroluScientific

CLASSIFICATION:

Kingdom – PlantaeAngiosperms Eudicots Rosids
Order - Malpighiales Family – EuphorbiaceaeGenus - Euphorbia Species - E. Thymifolia
Binomial name - Euphorbia thymifolia
L. Synonyms - Chamaescye hirta (L.) Millsp
It's 40 centimetres in height and either scarlet or purple. The edge of the leaf on the right is jagged and serrated. It measures

between 1 and 2.5 cm in length, is acute or subacute, and is elliptic-oblong to oblong-lanceolate. The border is serrated and has a bright underside.The fruits are 1-2 mm in diameter, yellow, three-celled capsules with keeled surfaces that are hairy. Three brown, angular, four-sided, wrinkled seeds are contained in each capsule. Annual plant that is hairy, with many branches that branch out from the base and a short stem.

THERAPEUTIC APPLICATIONS:

Written orders for medicine E. hirta is used to treat a variety of illnesses, including conjunctivitis, bronchitis, and hay fever, as well as gastrointestinal problems like diarrhoea, dysentery, and intestinal parasitosis. There are several accounts of E. hirta's tonic and hypotensive effects. The aqueous extract possesses anti-inflammatory, analgesic, antipyretic, and relaxing effects. Eyelid styes are treated with stem sap, and boils and swelling are treated with a leaf poultice (5).It has been discovered that E. hirta extracts have anticancer properties. The herb's aqueous extract significantly decreased the production of prostaglandins I 2, E2, and D2. The aqueous extract also prevents the infection of rice, wheat, maize, and mustard crops with aflatoxin (6).Leaf methanolic extracts contain antibacterial and antifungal properties. On scratchy soles, warm leaves blended with turmeric and coconut oil are applied. Similar to surma, ocular ulcers are treated by applying E. hirta's latex to the lower eyelids. The juvenile meloidogyne incognita is nematicidally affected by the root exudates (7). Dry herb decoction is used to treat skin conditions. Thrush is treated by gargling with a fresh herb decoction. For nursing women who lack milk, root decoction is also advantageous. Snake bites can also be treated using roots. E. hirta's polyphenolic extract possesses antispasmodic and antiamoebic properties. Quercitrin, a flavonoid glycoside derived from the herb, reportedly has a calming impact on respiration and displayed antidiarrheal activity (8). Rats exhibit hypoglycemic activity after ingesting the alcohol extract of the entire plant. The genito-urinary tract is sedated by it.

PHARMACOLOGICAL ACTIVITIES:

Herbal medicines have evolved into a crucial part of accepted medical practise based on a combination of traditional use and contemporary study.

ANTIBACTERIAL ACTIVITY:

The saponification procedure makes use of E. hirta that has been extracted with chloroform, methanol, acetone, and ethanol. The effectiveness of plant extracts against uropathogens was evaluated using the agar disc diffusion technique to determine if they are effective or not. Euphorbia hirta Linn. was found to have strong inhibitory efficacy against the majority of the 11 pathogens examined. Most kinds of bacteria were resistant to E. hirta extracts, including Serratia marcescens, Enterobacter cloaceae, Citrobacter koseri, and Citrobacter freundii, while Pseudomonas aeruginosa and Staphylococcus epidermidis were the most sensitive. The study's findings suggest the production of herbal medicines as alternatives in urological practise, as well as the potential of applying updated antibiotic regulations (10).

ANTI-DIABETIC ACTIVITY:

Researchers were able to determine the anti-diabetic properties of the E. hirta extract by orally administering it to rats (300 mg/kg b.w./day for 30 days). Researchers evaluated the leaf extract's antioxidant activity by comparing it to other oxidants such as lipid peroxides, hydroperoxides, and enzymatic and non-enzymatic antioxidants (11).

NEPHROPROTECTIVE ACTIVITY:

Ethanol extract of E. hirta was evaluated for its capacity to preserve the kidneys of albino rats following induction with nitrobenzene (1000 mg/kg body weight). The kidney tissues were tested for total thiol, reduced glutathione (GSH), and vitamin C levels. Superoxide dismutase (SOD), glutathione-S-transferase (GST), glutathione peroxidase (GPx), and glutalase (CAT) activity were also measured. Histological examinations were performed on the renal tissue samples. The results demonstrate that E. hirta ethanol extract mitigates renal failure and may offer powerful protection against nitrobenzene-induced nephrotoxicity due to its antioxidant capabilities (12).

ENZYMES INHIBITION ACTIVITY:

The effects of methanolic extracts on glutathione-transferase (GST), acetylcholinesterase (AChE), carboxylesterase (CES), and xanthine oxidase (XO) were studied at a concentration of 100 g/mL (13).

ANTIOXIDANT ACTIVITY:

After extracts of the flowers, roots, and stems, which exhibited, correspondingly, lesser levels of activity, at (52.451.66%, 48.59.97%, and (44.420.94%), the extract of the leaves had the greatest level of DPPH scavenging activity at (72.960.78%). BHT was present in an usual proportion of 75.13 percent. BHT IC (50) values varied from 0.803% in the leaf to 0.989% in the flower to 0.989% in the root to 0.794% in the stem (14).

IMMUNOMODULATORY ACTIVITY:

Using straightforward methods like the macrophage activity test, carbon clearance test, and mast cell de granulation assay, the immunomodulatory activity of the methanolic extract of E. hirta has been demonstrated (15).

MOLLUSCICIDES ACTIVITY:

To determine whether or whether Indoplanorbis exustus and Euphorbia Lymnaea (Radix) acuminata, two species of freshwater snails, could tolerate a powder made from Linn latex, the snails were exposed to the powder in a pond. These mixtures were effective in repelling both types of snails, albeit the effectiveness varied with exposure time and concentration (16).

ANTI-CYTOTOXICITY ACTIVITY:

The alcoholic extract of E. hirta protects against the cytotoxicity caused by antitubercular drugs in freshly separated hepatocytes. Anti-tubercular medications decreased serum concentrations of triacylglycerol (TAG), cholesterol, total protein, albumin, direct bilirubin, aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), and lactate dehydrogenase (LDH) (17).

ANTIDOTE ACTIVITY:

CFP, sometimes referred to as fish poisoning, is a dangerous medical condition. As a result of increased public interest, scientific research into the efficacy and therapeutic potential of medicinal plants has expanded. Many scientists have worked to provide evidence to back up the traditional assertions made about the plants. The pharmaceutical industry holds a lot of promise for EH. Ciguatoxins from this plant have undergone extensive research because to its immuno-bioactive qualities, which include antibacterial, anti-inflammatory, analgesic, antipyretic, antihistaminic, anti-diabetic, antianemic, and other activities (CTXs). Since there is no cure for CFP, patients often get supportive and symptomatic care. However, E. hirta methanolic extract has shown anti-CFP protective properties (18).

ANTIFUNGAL ACTIVITY:

The agar disc diffusion technique was used to evaluate methanolic extracts of several Euphorbia hirta parts against a single yeast (Candida albicans). We used 16-29 mm-wide 'inhibitory zones' in our experiments. Flower extract showed fungicidal effect, however leaf extract inhibited yeast development in wide, circular areas (19).

ANTHELMINTIC ACTIVITY:

In vitro anthelmintic testing of E. hirta ethanol extracts was performed using the worm model organism Caenorhabditis elegans and the bovine filarial parasite Onchocerca ochengi. Inhibitory effects became apparent over time when extracts were used to encourage worm growth at increasing doses. E. hirta extract ethanol significantly reduced C. elegans and O. ochengi viability (20).

ANTI-ANXIETY ACTIVITY:

Euphorbia hirta hydro-alcoholic extract (EH) was effective in reducing anxiety and stress in chronically distressed rats, as measured by the elevated plus maze (EPM) and open area tests (OFT). Anxiety in people experiencing extended immobilisation stress was greatly decreased after treatment with EH (200 mg/kg orally for seven days). EH's anxiolytic impact was significantly attenuated by 1 mg/kg intravenous bicuculline, 1 mg/kg intravenous picrotoxin, or 0.5 mg/kg intravenous flumazenil, all of which show that EH's activities are mediated through anti-inflammatory properties. Euphorbia hirta L. (EH) ethanolic extract is utilised to treat lipopolysaccharide-induced inflammation due to its anti-inflammatory effects (LPS). The inflammatory model of GABA(A) receptor-benzodiazepine receptor-Cl (-) channel complexlipopolysaccharide (LPS)-activated macrophage cells (RAW264.7) was used to investigate the effects of the ethanolic extract of Euphorbia hirta L. (EH) and its active component (21). Reverse transcription polymerase chain reaction, western blotting, and colorimetric assays (Griess reagent) can all be used to evaluate nitric oxide (NO) production and iNOS protein expression (RT-PCR). Through the use of ELISA, we were able to keep tabs on PGE (2), TNF-alpha, and IL-6 levels all at once. Findings revealed that EH considerably decreased LPS-induced NO generation in the concentration range without cytotoxicity and had a dose-related impact on inflammation via its active component, beta-amyrin (22).

ANTIMUTAGENIC ACTIVITY:

When tested against mutant Salmonella typhimurium TA98 and TA100 strains in the Ames test, both the aqueous and methanolic extracts of Euphorbia hirta showed anti-mutagenic action. In Salmonella typhimurium TA98, it was found that quercetin (25 microg/mL) is highly carcinogenic, both in the absence and presence of S-9 metabolic activity. When tested with Salmonella typhimurium TA98 and TA100 strains at concentrations up to 100 microg/mL in the absence and presence of S-9 metabolic activity, neither the aqueous nor the methanol extracts showed any carcinogenic effects (23).

ANTIVIRAL ACTIVITY:

It was shown that the RT activity of HIV-1, HIV-2, and SIV was directly impacted by the aqueous extract (mac251).Aqueous extract of E.hirta has antiviral properties. For all three viruses, there was a dose-dependent decline in RT activity (24).

ANTI-ARTHRITIC ACTIVITY:

When administered in tiny doses, water extracts from Euphorbia hirta can effectively treat arthritis by stopping the degeneration of cartilage (25).

LARVICIDAL ACTIVITY:

Aedes aegypti L. and Culex quinquefasciatus early fourth instar larvae were tested for susceptibility to Euphorbia hirta extracts in ethyl acetate, butanol, and petroleum ether (Say).24 hours after exposure, larvae started to die. There were several ratios investigated. The vectors of dengue and lymphatic filariasis, Aedes aegypti and C. quinquefasciatus, can be eliminated from the environment using this method (26).

ANTI-HELICOBACTER PYLORI ACTIVITY:

Sources of methanol from plants Zone widths of inhibition for Euphorbia hirta's anti-Helicobacter pylori activity ranged from 0 to 30 mm. Due to H. pylori, these extracts have relatively high antibacterial action against the isolates (27).

ANTI-ANAPHYLACTIC ACTIVITY:

The anti-anaphylactic properties of Euphorbia hirta ethanolic extract (EH A001) have been well-documented. At doses between 100 and 1000 mg/kg, EH-A001 protected animals from developing systemic anaphylaxis in response to compound 48/80. Mice were prevented from developing an active paw allergy, while rats were protected from passive cutaneous anaphylaxis, when given EH-A001 at the same dose (PCA). Anti-DNPHSA-stimulated mast cells in the peritoneum of rats were blocked in their ability to produce TNF-alpha and IL-6 by EH-A001 (28).

ANTI-MICROBIAL ACTIVITY:

The antibacterial efficacy of an ethanolic extract of Euphorbia hirta's aerial parts was examined. The effects of this plant have been demonstrated to be ineffective against the uropathogen Escherichia coli, as well as the common bacteria Proteus vulgaris, Pseudomonas aeruginosa, Staphylococcus aureus, and E. coli (29).

ANTI-DIARRHEAL ACTIVITY:

Euphorbia hirta aqueous leaf extract prevented castor oil-induced diarrhea and slowed gastrointestinal motility in healthy rats and mice (30).

ANTI-MALARIAL ACTIVITY:

Terpenes, steroids, coumarins, flavonoids, phenolic acids, lignans, xanthones, and anthraquinones are only a few of the many bioactive compounds found in Euphorbia hirta. The effect of ethanol extracts on the growth of Plasmodium falciparum. The pharmacological effects of ethanol and chloroform extracts of the E. hirta plant, both of which are utilized in traditional Congolese medicine to treat malaria, were evaluated (30).

ANTIFERTILITY ACTIVITY:

Male albinos, at the age of 38 weeks, were given aqueous crude extracts of E. hirta to test for effects on the male reproductive system. The results showed that the rats given the aqueous crude extract of E. hirta experienced various degrees of testicular degeneration and a decrease in the mean diameter of their somniferous tubes (STD). This demonstrates that the aqueous crude extracts of E. hirta may cause damage to the rat testes and other reproductive organs (3).

ANTI-AMOEBIC ACTIVITY:

In vitro testing for anti-amoebic and spasmolytic activities was performed on three key extracts from a variety of standard formulations generated from plants used in antidiarrheal drugs. The polyphenolic fraction has been shown to have higher levels of biological activity than the saponin and alkaloid-containing fractions. The most effective polyphenolic extracts were found in the whole Euphorbia hirta plant, with a minimum inhibitory concentration (MIC) of 10 micrograms/ml, which inhibited the growth of Entamoeba histolytica. The same extracts showed a higher than 70% suppression of cholinergic and/or KCl solution-induced contractions on isolated guinea pig ileum when given at a concentration of 80 micrograms/ml in an organ bath. 7m When tested at a concentration of 6 g/ml, the extract from the whole Euphorbia hirta plant inhibited parasite multiplication by more than 60%. Oral administration of 100-400 mg/kg/day of E. hirta extract to infected mice significantly reduced parasitaemia (31).

DIURETICS ACTIVITY:

The plant's aqueous and ethanolic extracts (50 and 100 mg/kg) increased urine production over time. Using the water extract resulted to a rise in the concentration of Na+, K+, and HCO3- in the urine.The ethanol extract enhanced HCO3 excretion, decreased K+ loss, and lowered K+ loss but had no effect on renal Na+ clearance. Acetazolamide, like the water extract, increased urine flow and facilitated the elimination of Na+, K+, and HCO3-. Furosemide, a high-ceiling diuretic, did not affect renal K+ or HCO3 excretion, although it did considerably increase renal Na+ and Cl- excretion. This research shows that the active component(s) in the aqueous extract of E. hirta leaf are the same as those found in the diuretic acetazolamide (32).

ANALGESIC AND ANTIPYRETIC ACTIVITY:

Antipyretic and analgesic activities are shown by a lyophilized aqueous extract of Euphorbia hirta L. in response to thermal (hot plate test), chemical (writhing test), and yeast-induced hyperthermia in rats and mice (2).

ANTIASTHMATIC ACTIVITY:

According to studies, E. hirta slows breathing and relaxes the bronchial airways, which gives it anti-asthmatic qualities (33).

GALACTOGENIC ACTIVITY:

Powdered E. hirta administered to guinea pigs before to puberty raised the size of their secondary sexual organ and stimulated milk production (34).

REPELLENT AND ANTIFEEDANT ACTIVITY:

Repellant and anti-feedant activities have been shown in ethanol extracts of Euphorbia hirta. Antifeedant rates more than 80% were found in all Plutella xylostella diamondback moth (DBM) larvae (35).

IMMUNOSTIMULANT ACTIVITY:

In this experiment, Cyprinus carpio's immune system was boosted with the use of immunostimulants derived from Euphorbia hirta leaf extract. The treated fish with Aeromonas hydrophila infection underwent haematological, immunological, and enzymatic assays. The outcomes of the haematological tests showed that at greater leaf extract concentrations, sick fish had elevated RBC, WBC, and haemoglobin levels. The current study used leaf extract from the Euphorbia hirta plant as immunostimulants in order to improve Cyprinus carpio's immunological capacities. It could only boost the production of antibodies up to the fifth day when given bigger amounts of plant leaf extract (25 g and 50 g) (36).

ANTICANCER ACTIVITY:

An extract from Euphorbia hirta L. exhibits anti-inflammatory, antioxidant, and anticancer effects, according to a separate study. Using electron spin resonance, the complete E. hirta ethanol extract's antioxidant properties were assessed (37).

PHYTOCHEMISTRY:

Many of the active components in E. hirta have been found via various studies. Afzelin, quercitrin, and myricitrin have all been detected in a methanolic extract of E. hirta. The chemical study of E. hirta resulted in the isolation of rutin, quercitrin, 2, 4, 6-tri- β-O-galloyl-d-glucose, 1, 3, 4, 6-tetra-β-O-galloyl-d-glucose, kaempferol, gallic acid, and protocatechu. In addition to rhamnose, chtolphenolic acid, choline, camphol, and quercitol derivatives, it also comprises tinyatoxin, β-amyrin, 24-methylenecycloartenol, β-sitosterol, heptacosane, and 1, shikmic acid. Cresonance spectrophotometric analysis of 1,1-diphenyl-2-picryl-hydrazyl (DPPH), hydroxyl, and alkyl radical levels, as well as high-performance liquid chromatography (HPLC)-2, 2'-azino-bis (3-ethylbenzothiazoline6-sulfonic acid) experiments, demonstrated that the extract possessed selective anticancer activity. E. hirta ethanol extract (0.5 mg/mL) had 61.19% 0.22% DPPH-scavenging activity, which was lower than the 100% 0.22% shown in the positive control (0.5 mg/mL ascorbic acid). The half-maximal DPPH absorption (IC50) concentration of extract was 0.205 mg/mL. Antioxidant activity was also found by online HPLC analysis of the extract. The anti-inflammatory effects of the E. hirta extract were tested in RAW 264.7 macrophages after they were exposed to induced lipopolysaccharide. The formation of nitric oxide was significantly suppressed, and the anti-inflammatory action was amplified, when 200 g/mL E. hirta extract was present (p 0.05). The extract showed selective antitumor activity at a certain concentration (37).

CONCLUSION:

According to a survey of the literature, the plant EH's many parts have a multitude of therapeutic properties, which has piqued the curiosity of numerous experts who want to scientifically study the plant to learn more about its potential as a powerful healing agent. The plant's extract has been used in a number of pharmacological research. Because the concentration of the chemicals is 100 g/mL (p 0.05). These findings demonstrated the potential of E. hirta for use in the development of herbal antioxidant, anti-inflammatory, and anti-cancer drugs and argued for further investigation of this plant. As a concentration, it measures in at 100 g/mL. (p 0.05). These findings suggest that E. hirta warrants more research for its potential to contribute to the development of herbal antioxidant, anti-inflammatory, and anti-cancer drugs.

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