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A COMPREHENSIVE REVIEW ON PLANT OF *EUPHORBIA HIRTA LINN*.

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ABSTRACT: Plants serve human as a primary source of food, shelter, and medicine. So, understanding the plants uses in treating diseases is very important for leading a healthier life. Helminthes infection are usually found in community and are well recognized as cause of much acute and chronic illness among the individual as well as cattle's. For evaluating that we select the *Pherithema posthuma* a Helminthes is frequently known as earth-worms. For that we evaluated the anthelmintic activity of aqueous and methanolic extracts of leaves of *Euphorbia hirta linn*. (euphorbiaceae) using different concentration of above solvent extract we evaluated the Time of paralysis (P) and Time of death (D) of the worms. The main active constituent responsible for showing the anthelmintic efficacy in the *Euphorbia hirta* plant is believed that Quercetin, a flavonoid. This plant contains several bioactive compounds, butquercetin has been widely studied for its broad-spectrum biological activities including anthelmintic activity. Albendazole (Std) was used as standard. Anthelmintic drug and Dis. H2O was used as a control. The result of this study indicated that methanolic extract significantly exhibited paralysis(P) in worms in lower dose and also caused death of worms especially at higher concentration, as compared to standard drug.

INTRODUCTION: People live in poverty in growing countries, they often suffer from Helminthes infection. The most contingent reason is poor hygiene, poor sanitation and malnutrition, and close contact with infectious vectors, domestic animals, *etc*., this infection is most common in man as well as farm animals which wog the large population of the world which contribute under nutrition, anemia, eosinophilia, pneumonia, *etc* [1]. Helminthic infection is majorly caused due to a sanitary problem and is associated with food chain of human and animal.

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Parasitic eggs present in human fecal can contaminate the soil where they embryonate and are taken back into the intestinal tract through nigglingly (poorly) treated food and drinking water. So, this in turn they cause repeated recurrent infection that is often difficult to break [2]. For treating such a helminthic infection one plant is commonly used, such as the *Euphorbia hirta*. The *Euphorbia hirta* plant is also called as milkweed (dudhy) or Asthma plant. *Euphorbia hirta Linn*. is an annual herb belongs to the genus euphorbia and family euphorbiaceae.

It is known by different names in different parts of the world. The plant is usually characterized by the presence of white colored milky latex, which is less/more toxic [3]. *Euphorbia pilulifera* (L) is a small herbaceous plant and is widely distributed in all tropical and subtropical regions of the world. The plant growing in roadsides, garden and

cultivated area. It is exhaustively used in current traditional medicine for treating a variety of therapeutic gestures such as gastrointestinal, respiratory and liver infection [4]. *Euphorbia hirta* is an annual herb growing up to 15-50cm height, elongated or increasing, hairy structure with long often yellow colour crisped hair; stems are usually cylindrical; branches are generally lanceolate or obovate- lanceolate, acute or sub-acute, dark green above, base commonly different sided acute or subacute [5]. The plant leaves are found to contain flavonoids, tannin, sterol, polyphenol, glycosides, alkaloids [6]. *Euphorbia hirta* is a more putative herb, that is widely used in the form of decoction or infusion to treat various affliction including intestinal parasites, peptic ulcer, diarrhea, vomiting, heartburn, amoebic dysentery, asthma, bronchitis, hay fever, laryngeal spasms, emphysema, cough, colds, menstrual problem, kidney stones and venereal diseases [7].

Recently, modern pharmacological examination showed that the plant and its active agents haunted the wide pharmacological actions such as anti-inflammatory, antifungal, antibacterial, anti-diarrheal, sedative, analgesic, anxiolytic, antipyretic, antioxidant, antimalarial, antitumour, antiasthamatic, diuretic, larvicidal and enhances electrolytes among other peoples (Lanhers *et al*, 1990; Lanhers *et al*, 1991; Johnson *et al*, 1999; *Euphorbia hirta* L. Available: http://florabase.dec.wa.gov.au/browse/profile.php/4629) [8].

The most important aim of this review study was to scrutinize /examine the secret behind the medicinal value of the euphorbiaceae family plant, to find out such an important other medicinal use which could present in the plant to establish a relevant scientific data on its traditional uses [9].

Plant Biography:

FIG. 1: *EUPHORBIA HIRTA* PLANT

FIG. 2: *EUPHORBIA HIRTA* FLOWER

FIG. 3: *EUPHORBIA HIRTA* FRUIT

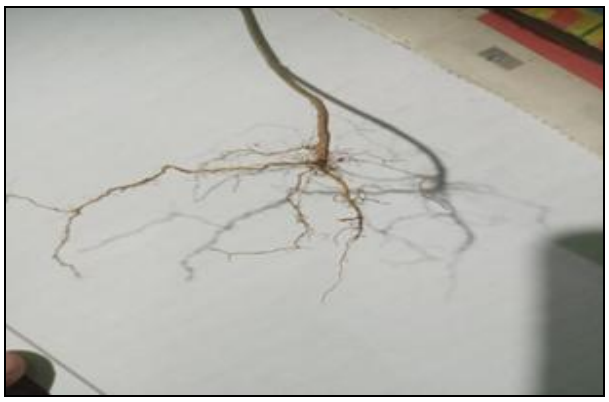


FIG. 4: *EUPHORBIA HIRTA* ROOT

Taxonomical Classification [10, 11]:

Kingdom: Plantae

Sub-kingdom: Viridiplantae

Infra Kingdom: Streptophyta

Division: Tracheophytes

Sub-division: Spermatophyte

Infra Division: Angiosperms

Class: Magnoliopsida

Super Order: Rosanae

Order: Malpighiales

Genus: Euphorbia

Family: Euphorbiaceae

Species: *Euphorbia hirta*

Synonyms [12]: *Chamaesyce gemella* (Lag.) small, *Chamaesyce hirta* (L.) Millsp., *Chamaesyce hirta* (L.) small, *Chamaesyce hirta* var. glaberrima (Koidz.) H. Hara, *Chamaesyce hirta* f. glaberrima (Koidz.) Hurus., *Chamaesyce hirta* var. laeticincta Croizat, *Chamaesyce hirta* f. litoralis Hurus., *Chamaesyce karwinskyi* (Boiss.) Millsp., *Chamaesyce pekinensis* var. glaberrima (Koidz.) Makino & Nemoto, *Chamaesyce pilulifera* var. glaberrima (Koidz.) H. Hara, *Chamaesyce rosei* Millsp., *Desmonema hirta* (L.) Raf., *Ditritea hirta* (L.) Raf., *Euphorbia bancana* Miq., *Euphorbia capitata* Lam., *Euphorbia chrysochaeta* W. Fitzg., *Euphorbia gemella* Lag., *Euphorbia globulifera* Kunth, *Euphorbia hirta* var. destituta L. C. Wheeler, *Euphorbia hirta* var. glaberrima Koidz., *Euphorbia karwinskyi* Boiss., *Euphorbia nodiflora* Steud., *Euphorbia obliterata* Jacq., *Euphorbia pilulifera* Jacq., *Euphorbia pilulifera* var. arechavaletae Herter, *Euphorbia pilulifera* var. discolor Engelm., *Euphorbia pilulifera* var. glabrescens Thell., *Euphorbia pilulifera* var. guaranitica Chodat & Hassl., *Euphorbia pilulifera* var. hirta (L.) Thell., *Euphorbia pilulifera* var. hirta (L.) Griseb., *Euphorbia pilulifera* f. humifusa Domin, *Euphorbia pilulifera* var. obliterata (Jacq.) Hitchc., *Euphorbia pilulifera* f. rubromaculata Domin, *Euphorbia pilulifera* f. viridis Domin and *Tithymalus pilulifer* (L.) Moench.

Vernacular Name:

English	Asthma plant, asthuma weed, garden spurge, pill-bearing spurge, snake weed
Hindi	Dudhi
Sanskrit	Dugdhika, Kshirini, Ksheerani, Svaduparni
Telugu	Reddinanab rolu
Tamil	Amampatcharishi
Gujarat	Dudeli
Malayalam	Chittirappula, Nelapalai
Bengali	Barokheruie
Marathi	Dudhi, Mothidudhi
Malaysia	Ambin Jantin
Indonesia	Daun Biji Kcang
Philippines	Botobotonis
Thailand	Nam Nom Raatchasee
Sundanese	Nanangkaan, Nangkaan
Arabic	Labeinah, Em elhaleeb, Euphorbia
Spanish	Golondrina, Hierba de boca, Lecheron chico, Lecherita, Pichoga.

Plant Description [13, 14]:

Flowers: Flowers are unisexual, season of the flower is throughout the year.

Maleflowers: Proximate, fringed, lineate bracteoles, unique stamen, with default periapt.

Fruits: The plant has allomorphic pistillate fruits. Fruit of the plant exerted a 3-lobed capsule, three seeded, covered with short hairs. Green colored fruit with fleshy prickles. 1-2 mm in diameter.

Seed: Seeds are very small, rectangle (0.57-0.70mm long, 0.065mg/seed) (Noda *et al.* 1984), 4-sided pinkish-brown, slenderly wrinkled.

Stem: Stem of the plant are small, hairy and long with monopodial branching pattern. Internodes of the plant are 2.5-3 cm in length, stipules present.

Leaves: Leaves are present in opposite pairs on the stem. Leaves have a curved base and are simple, elliptical to slightly rhombic hairy, with a jauntily dentate margin.

Roots: It has developed and different/distinct primary root, i.e. tap root system.

Medicinal Uses [1, 15]: The whole plant is used as astringent and hemostatic (stop bleeding); as poultice applied to ulcer, inflamed glands, oedema

and also used in affection of childhood, cough and in worms. The plant is used to treat /cure severe pain such as headache, toothache, colic rheumatism, and pains occur during pregnancy. The extracted juice of this plant has emollient/sedative effect on the mucous layer of the respiratory and urinary tract. This plant is used to treat poison condition (antidote) and pain relief of scorpion stings and snakebites.

Chemical Constituents: The *Euphorbia hirta* plant contains phenols, terpenoids, flavonoids, tannins, acids, essential oil, and other components.

Flavonoids: Leucocianidol, euphorbianin, camphol, quercetin, quercitol. (Gupta., 1966 & Blanc *et al.*, 1972).

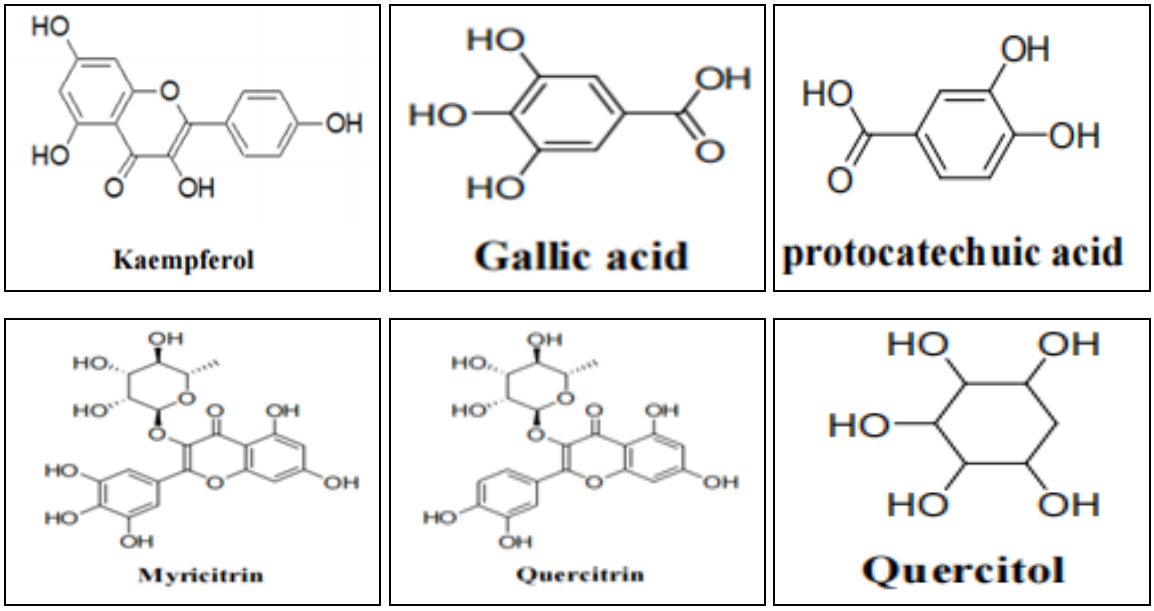
Polyphenols: Gallic acid, myricitrin, 3-4-di-ogalloylquinic acid, 2,4,6-tri-O-galloyl Dglucose, 1,2,3,4,6-penta-O-galloyl-β-D-glucose (Aqil.,1999 & Chen., 1991)

Alkanes: Heptacosane, n-nonacosane and others (Martinez *et al.*, 1999).

Tannins: Euphorbins A, B, C, D, E (Joseph *et al.*, 2002).

Triterpenes and Phytosterols: β-Amyrin, 24-methylenecycloaryenol and β-sitosterol (Yoshida *et al.*, 1989).

Chemical Structure:



Geographical Distribution [10]: The plant is widely distributed around the hottest parts of India and Australia, and frequently found in waste places along the road sides. In India it will seen in Uttar Pradesh, Gujarat, Bihar, Madhya Pradesh, Himachal Pradesh and west Bengal.

Pharmacological Activity:

Anthelmintic Activity: Manjusha wath *et al.*, studied the anthelimintic activity of two drugs, i.e. *Acalypha indica* L. and *Euphorbia hirta* L. have been confirmed as its methanolic and acetone extracts shows significant an thelmintic activity. This extract also proved to be efficient than standard drug [1]. The anthelmintic effectiveness of the aqueous crude extracts of *Euphorbia hirta* L. was studied by P. Duez on nigerian dogs that were infected with nematodes. Outcome of this study shows that aqueous. Crude extracts of *Euphorbia hirta* after administration into local dogs produced a significant enhance ($P<0.05$) in PCV, RBC, Hb conc, TWBC and lymphocytes counts. Also experienced a decreased in Faecal egg count showed a remarkable and vital reduction in the level of identified in helminthes [16].

Antibacterial and Antifungal Activity: Simanjuntak *et al* studied the antibacterial and antifungal activity in the year 2021. The ethanolic

Extract of *E. hirta* plant shows the diameter of the inhibition zone on the growth of bacteria *Staphyllo Coccus epidermis, E. coli* and fungi *Candida albicans* at a concentration of 12.5%; 25%; and 50% and 75% with stronger activity [17].

Antimicrobial Activity: M sudhakar *et al.,* was evaluated the antimicrobial activity using ethanolic extract of aerial parts of *E. hirta* on some pathogenic bacteria by agar well diffusion and MIC_S by tube dilution method. The Result shows that extract exhibit a broad range of activity, particularly against *E. coli, Proteus vulgar* is *Pseudomonas aeruginosa and Staphyllococcus aureus* [18].

Antidiabetic Activity: Goldie Uppal *et al* was studied the antidiabetic activity of whole plant of *Euphorbia hirta* on Wistar rats using ethanolic extract. The results shows that a decreased blood glucose level on alloxan - induced diabetic rats [19]. Sunil Kumar *et al* studied the antidiabetic effect of ethanolic extract of leaves, flower, stem of *Euphorbia hirta* was studied in streptozotocin induced diabetic mice. Oral administration of all the extract shows the significant reduction in the blood sugar level at the 15th day of the study [20]. Hydro alcoholic extract of *Euphorbia hirta* was investigated for their antidiabetic property on alpha- glucosidase inhibition activities. The anti-diabetic activities revealed that AcoET and BuOH have a very significant inhibitory potential on the enzymatic activity of α-glucosidase with an IC_{50} values of 1.295±0.035 and 2.188±0.204µg/ml respectively [21].

Antimalarial and Larvicidal Activity: Liu Y *et al.* (2007) identified that methanolic extracts of aerial part of *Euphorbia hirta* shows proliferation inhibition of *Plasmodium falciparum*. The antimalarial activity of *Euphorbia hirta* was due to presence of flavanol glycosides quercetin and myricetin with IC_{50} values of 1.1, 4.1, and 5.4µg/ml respectively [22]. Abdul Rahuman *et al.* (2008) were evaluated ethyl acetate, butanol and petroleum ether extract of *Euphorbia hirta* for larvicidal activity. The larval mortality was observed after 24 hours of exposure. All extracts of the plant showed larvicidal effects; but highest larval mortality was found petroleum ether extract. The LC_{50} value of petroleum ether extract was 272.36 ppm against *Aedes aegypti* L. and 424.94 ppm against *Culex quinquefasciatus* [23].

Sharma P *et al.* (2009) were also tested extract of *Euphorbia hirta* against the larvae of *Anopheles stephensi,* the urban malaria vector. LC_{50} values for carbon tetrachloride extracts of *E. hirta* against the larvae are 11,063.00 and 10,922.00 ppm after 24 and 48 h exposure, respectively. For [31] and 48 h of exposure. In the case of petroleum ether extract, LC50values after 24 and 48 h exposure period are 9,639.00 and 7,752.00 ppm [24].

O. Iyekowa *et al* (2021) were evaluated the methanolic extract of *Euphorbia hirta* for the antimalarial activity. The malarial chemo suppression activities obtained during the therapy of *P. falciparum*-infected mice with the methanolic extract of test sample and positive control quinine with the dose 2.75, 1.37, 18.71% with respective weight of 0, 2, 4 mg/kg. All the doses of methanolic extract of *Euphorbia hirta* shows the significant suppression [25].

Anticancer Activity: Loh *et al.* (2009) found that the aqueous extract of whole plant of *Euphorbia hirta* at 100µg/ml and methanol extract at 10 and 100µg/ml exhibited strong anti-mutagenic activity against the mutagenicity of 2-aminoanthracene in the presence of S-9 metabolic activating enzymes. The antimutagenic activity of aqueous and methanolic extract was studied in *Salmonella typhimurium* TA98 [26]. *In-vitro* anticancer activity against the liver cancer HepG2 cells was studied on *Euphorbia hirta* plant. The administration of plant extract exhibited the remarkable diminution in the cell proliferation and effectively induced the apoptosis in the HepG2 cells. *In-vitro* study of plant finding out that plant extract effectively inhibited the cells proliferation and triggered the apoptosis in the liver cancer HepG2 cells [27].

Antiacne Activity: *Propionibacterium* acnes has been recognized as pus-forming bacteria causing an inflammationin acne. The study was conducted to evaluated the antimicrobial activities of euphorbia hirta against *Propionibacterium acnes*. The ethanolic extract of *Euphorbia hirta* (roots) was tested for antimicrobial activity by disc diffusion and broth dilution methods. The result obtained from the disc diffusion method shows that

Euphorbia hirta could inhibit the growth of *Propionibacterium acnes* [28].

Wound Healing Activity: Jaiprakash Bstudied the wound healing activity of ethanolic extract of *Euphorbia hirta*. The histopathological study, W.B.C. count and hemostatic activity were carried out to support its wound healing activity. The ethanolic extract of the plant has promoted wound healing activity and probable mechanism may the promotion of collagen biosynthesis which further supports for increase in tensile strength of the granuloma tissue. This evidence supports the use of *Euphorbia hirta* to cure the wound [29].

Pushpendra Kumar Jain (2020) were found the wound healing activity on aerial parts of ethanolic extract of *Euphorbia hirta* and its polyherbal formulation. On 18th day of the experiment extract ointment of *Euphorbia hirta* treated group healed 100% and simple ointment treated group shoes 95.71% healing. The final results shoes that ethanolic extract of *E. hirta* ointment possesses a definite prohealingaction[30].

Anti-oxidant Activity: The study, conducted by Praveen *et al.* in 2024, investigated the antioxidant and anti-inflammatory properties of ethanolic extracts from the leaves of *Euphorbia hirta*. The researchers tested the extracts against DPPH (2,2-diphenyl-1-picrylhydrazyl) radicals, which are commonly used to measure antioxidant activity. The results showed a dose-dependent increase in antioxidant activity, meaning that as the concentration of the extract increased (from 100 to 500 µg/mL), the percentage of inhibited DPPH radicals also increased.

The highest antioxidant activity was observed at a concentration of 500 µg/mL, which was comparable to the standard substance used in the study. Overall, the study found that the ethanolic extracts of *Euphorbia hirta* leaves exhibited significant antioxidant and anti-inflammatory activity, suggesting potential uses in preventing or treating diseases related to oxidative stress and inflammation [31].

Antifertility Activity: *Euphorbia hirta* plant show better antifertility activity at a dose level of 50mg/kg body weight. That reduced the sperm motility and density of cauda epididymal and testis sperm suspension significantly, leading eventually to 100% infertility. There by they show the better activity [32].

Diuretic Activity: The ethanolic extracts of *Euphorbia hirta* leaves were evaluated for their diuretic activity and also identify the possible mechanism of its action. The diuretic activity of the plant was studied on male albino rats by comparing to the standard drug. Select 2 possible dose 300 and 600mg/kg were administered and the volume of urine flow and electrolyte concentration were measured (Na^+, K^+). Out of 2 selected doses 600mg/kg body weight exhibited higher activity than 300mg/kg dose. The result shows that ethanolic extracts of *Euphorbia hirta* shows the potential diuretic activity and it was found that lupeol and quercetin were the major active constituent responsible for the activity [33].

Kanedi *et al* (2017). In this study, three different doses of *Euphorbia hirta* whole plant extract (38.67, 77.35, and 154.7 mg/kg), furosemide (3.6 mg/kg), and distilled water (negative control) were orally administered to fasted healthy male rats. The urinary parameters assessed included urine volume measured hourly for 6 hours, urine pH, and urine color density. The results indicated that the extract at doses of 77.35 mg/kg and 154.7 mg/kg significantly increased urine volume compared to the negative control, with no significant difference observed when compared to furosemide (α=0.05). However, there were no statistical differences in urine pH and urine color density among all treatments. In conclusion, the whole plant ethanolic extract of *Euphorbia hirta* demonstrates potential as a diuretic herb without causing significant changes in the pH and color of urine output [34].

Antiviral Activity: The antiretroviral activities of *Euphorbia hirta* extracts were investigated *in-vitro* using the MT4 human T lymphocyte cell line. The cytotoxicities of the extracts were evaluated *via* the MTT cell proliferation assay. Subsequently, the direct effects of the aqueous extract on HIV-1, HIV-2, and SIV (mac251) reverse transcriptase (RT) activity were measured, revealing a dose-dependent inhibition of RT activity for all three viruses. Further analysis focused on the HIV-1 inhibitory potency of *E. hirta*, comparing the activities of the aqueous and 50% methanolic

extracts. The 50% methanolic extract exhibited a higher antiretroviral effect than the aqueous extract. Liquid-liquid partitioning of the 50% MeOH extract with dichloromethane, ethyl acetate, and water showed that only the remaining aqueous phase had significant antiviral activity, while the lipophilic extracts were inactive. Upon removing the tannins from the aqueous extract, a marked decrease in antiviral activity was observed, indicating that tannins are likely responsible for the high antiretroviral activity [35].

Anti-Helicobacter Pylori Activity: The *E. hirta* plant show less anti-*Helicobacter pylori* activity using 95% ethanolic extract [36].

Galactogenic Activity: The plant powder was given to the female guinea pigs before puberty, there will be increased the development of mammary gland and induced secretion [37].

Antiamoebic Activity: The polyphenolic extract of whole plant of *Euphorbia hirta* inhibited the growth of *Entamoeba histolytica* with a minimum active concentration of <10µg/ml. The same extract, at a concentration 80µg/ml in an organ bath and they also exhibited >70% inhibition of acetylcholine and/or KCL solution-induced concentration on isolated guinea pig ileum [38].

Anti-Diarrheal Activity: Mallavadhani UV *et al.* (2002) were estimated the antidiarrhoeic marker of the whole plant of *E. hirta*, *viz.*, qercetin-3O-β-D-rhamnoside quantitatively over a number of samples collected from different parts of India by HPLC. The bioactive marker was found to vary significantly (0.013-0.108%) and accumulated to a maximum in the Triunelveli sample. The effect of various controlling parameters was studied and it was found that the varying proportions of plants parts in the samples of *E. hirta* is responsible for variation in active marker concentration [39].

Hore SK *et al.* (2006) were studied the aqueous extract of *Euphorbia hirta* on the G.I. motility in normal rats and castor oil-induced diarrhoea in mice. The extract that can lowers the G.I. motility in normal rats and lowers the effect of castor oil-induced diarrhea in mice [40].

Anti-epileptic Activity: E. Nago Bum *et al.* identified and reported that aq. extract of *Euphorbia hirta* were effective against pentylenetetrazol-induced convulsions [41].

Hepatoprotective Activity: Prashanth Tiwari *et al* (2011) was reported the Antihepatotoxic Activity of *Euphorbia hirta* and by using the combination of *Euphorbia hirta* and *Boerhaavia diffusa* Extracts on Some Experimental Models of Liver Injury in Rats induced by CCl4 or paracetamol. Hydroalcoholic extract (HE) from whole plant were tested. The hepatic dysfunction was accessed by determining different biochemical parameters in serum and tissues. In serum, the activities of enzymes like Aspartate Aminotransferase (AST), Alanine aminotransferase (ALT), alkaline phosphatase (ALP), alkaline phosphate (ALP), Bilirubin were evaluated. Lipid peroxidation and reduced glutathione were also measured into control and treated rats. *E. hirta* whole plant (HE) showed hepatoprotective activities at doses 125 mg/kg and 250 mg/kg, since serum levels of ALT and AST in rats given the extracts were significantly low ($p<0.05$ & 0.01 repectively) when compare to control CCL4 or paracetamol-injured rats. Further studies were carried on the HE from the whole part of both the plant by using the combination of the extract showed the highest level of hepatoprotective activity, which was effective at doses 75mg/kg and 150 mg/kg, for hepatoprotective activity in CCL4 and paracetamol injured rats. In experiments comparing the HE (125- 250 and 75- 150 mg/kg) to reference antihepatotoxic substance (silymarin) the HE exhibited a 70 and 80% hepatoprotection compared to the 80 and 90% one exhibited by silymarin in CCL4 or paracetamol -injured rats respectively. This study shows that hydroalcoholic extract *Euphorbia hirta* and *Boerhaavia diffusa* was effective in protecting the liver from toxic hepatitis [42].

Anti-inflammatory Activity: D. R. Dwijayanti *et al* (2024) were revealing the anti-inflammatory activity of *E. hirta*. Due to excessive production of nitric oxide (NO) dan pro-inflammatory cytokines can lead to tissue damage and chronic inflammation will occur. The plant *E, hirta*, which contain the range of active compound that demonstrated the better anti-inflammatory activity. This study investigates the anti-inflammatory activity using ethanolic extracts of whole plant of

E. hirta extract on gene expression and NO production in LPS-treated RAW 264.7 cells. The result demonstrate that *E. hirta* extract effectively suppress NO production in RAW 264.7 cells [43].

Fibrinolytic Activity: Patel *et al.* (2012) was purified and collected the latex of *Euphorbia hirta* by the combination of ion exchange and gel filtration chromatography to get a 34kDa serine protease, designated as hiritin, with fibrinolytic activity.

The Hiritin exhibited esterase and amidase activities along with azocaseinolytic, gelatinolytic, fibrinogenolytic and fibrinoltic activities. It mainly hydrolyzes Aα and α-chains, followed by Bβ and β, and γ and γ-γ chains of fibrinogen and fibrin clot respectively. The enzymatic activity of hirtin was noticeably inhibited by PMSF and AEBSF. The enzyme efficiently hydrolyzes the fibrinogen and fibrin [44].

Immunosuppressive Effects: Ahmed *et al.* (2013), were investigated immunomodulatory effect of *E. hirta* plant on T lymphocytes and Th1 cytokines in a dose-dependent manner. The ethanolic extract at concentration of 25, 50, 100 and 200mg/kg doses was given orally for 7 days from the day of immunization. The ethanolic extract shows maximum inhibition at 100 and 200 mg/kg and was found to significantly block the production of cell-mediated immune response and IL-2, TNF-α, TNF-γ and also prolongs graft rejection. The extract also shows a decrease/lower of delayed hypersensitivity response and dose-related decrease in the primary antibody response, respectively. So, the *E. hirta* is a potent immunosuppressor [45].

Angiotensin Converting Enzyme (ACE) Inhibiting Effects: The study conducted by L.A.D. Williams (1998) were investigated the ACE inhibition activity using methanolic extract of leaves and stem of *E. hirta* by 90% and 50% at the concentration of 500µg and 160µg respectively using enzyme linked immunosorbent assay (ELISA) technique. Intraperitonial administration of 10mg/100mg body wt of extract noticeably lowers the amount of water consumed by rats. This effect lasted for 2 hrs [46].

Sedative and Anxiolytic: Lyophilized aqueous extract of *Euphorbia hirta L*. has been evaluated for changes in behavioral effects in mice. Sedative properties could be confirmed by giving high doses (100 mg of dried plant/kg, and more), by a decrease/lower of behavioral parameters measured in nonfamiliar environment tests, whereas anticonflict effects appeared at lower doses (12.5 and 25 mg of dried plant/kg), by an enhancement/increasing of behavioral parameters measured in the staircase test and in the light/dark choice situation test. These findings validate the traditional use of *E. hirta* as a sedative and reveal original anxiolytic properties [47].

Aflatoxin Inhibition Activity: An aqueous extract of *E. hirta* plant noticeably inhibited aflatoxin production on rice, wheat, maize and groundnut [48].

Immunomodulatory: The Aqueous and aqueous-alcoholic extracts, of *E, hirta* containing flavonoids, polyphenols, sterols and terpenes, demonstrated immunostimulant activity. The aqueous extract affected lectin-induced lymphoblast transformation *in-vitro* [49].

Serum Biochemistry: The effects of the chromatographic fractions of *E. hirta* Linn were administered into rats in graded doses of 400mg/kg, 800mg/kg and 1600mg/kg orally for 14 days. After 14 days the serum biochemical parameters like total protein, globulin, albumin, alanine aminotransferase (ALT), alkaline phosphatase (ALP), aspartate aminotransferase (AST), total bilirubin, creatinine, and blood urea nitrogen (BUN) noticeably increase in rats [50].

Mollusicidal Activity: The aqueous and successively purified latex extracts of *E. hirta* have shown the potent molluscicidal activity. Sub lethal doses of aqueous and partially purified latex extracts of plant also significantly alter the levels of total protein, total free amino acid, nucleic acid and the activity of enzyme protease and alkaline phosphatase in nervous tissue of the snail Lymnaea acuminate in time and dose dependant manner. This is toxic effect of stem bark and leaf extract of *Euphorbia hirta* [51].

Spasmogenic Activity: Kamgang *et al.,* (2001) was identified and analysed the contractile activity of entire aqueous extract of *Mallotus oppositifolius* (MO) and *E. hirta* leaves in rat. *Mallotus oppositifolius* (1.32mg/ml) inhibited the excitation

of rat ileal contractions by acetylcholine (-9mm) and potassium chloride (-7mm). *E. hirta* operate the excitation of rat ileal contractions by acetylcholine (+148%). Eh aqueous extract also decreases the faeces quantity. The outcome settled that total aqueous extracts of *Mallotus oppositifolius* possess antispasmodic effect, while *Euphorbia hirta* shows own spasmogenic effect in vitro and antidiarrhoeic effects *in-vivo* [52].

Genotoxic Activity: Kwan Yuet Ping *et al,* (2012) Were examined genotoxic effect of methanolic extract of *E. hirta* using *Allium cepa* evaluation. The extracts 125, 250, 500 and 1000 µg/ml were tried out on root meristems of *Allium cepa*. Ethylmethane sulfonate and distilled water provided as positive control and negative control. A decrease in mitotic index and an increase in chromosome aberrations were noticed as the concentrations of *E. hirta* extract increased. Some deviation like bridges, c-mitosis, stickiness and vagrant chromosomes were too noticed. At interkinesis stage, micro nucleated cells too noticed. This outcome established that *E. hirta* methanol extract (1000 µg/ml) apply a remarkable genotoxic and mitodepressive effect [53].

Sperm Motility: Oyeyemi *et al,* 2009 exploit sexually matured and clinically healthy West African Dwarf (WAD) rams. The rams aged between 24 and 30 months were used for the study. The rams were first used as control and later as experimental animals upon being orally dosed with *Euphorbia hirta* extract at 400mg/kg body weight for 14 days. Semen samples were collected from the rams a day after the administration of the plant extra and seven days after. The objective of the study was to investigate the effect of *Euphorbia hirta* on the semen picture of WAD rams. There were significantly differences ($P < 0.05$) in the semen picture as reflected in a reduction of sperm motility from 80% to 47.5% and live-dead ratio from 90.75% to 32.5% in the control and post-experimental stages of the study respectively. This indicates that the fertilization capacity and livability of spermatozoa were negatively affected. There were no significant differences in the values of body parameters measured across the stages of the study. The plant is therefore not recommended for medicinal purpose in male animals [54]. Aqueous and ethanol extract of *E. hirta* leaf was prepared to qualitative phytochemical analysis using standard methods. Sixty-six (66) rats assigned into six groups A-F with 11 rats each were used in this study. Rats in groups A and B received 500mg/ kg and 1000mg/kg of aqueous extract respectively for 14 days, those in groups C and D received similar dosage for ethanol extract respectively while group E and F received distilled water and 10% DMSO+90% distilled water respectively for 14 days.

On days 1, 7 and 14 post treatments, three rats were sacrificed from across the group. The testes, epididymis and semen samples were collected for analysis and the Data collected were analyzed. Oral treatment of rats with 1000mg/kg aqueous leaf extract *Euphorbia hirta* increased the sperm motility, livability and count continuously for 14 days of treatment. Therefore, the aqueous plant extract can be used to improve the fertility of male breeding stock at 1000mg/kg bodyweight [55].

Effect on CNS: Lanhers *et al,* (1996) checked lyophilized aqueous extract of *E. hirta* for benzodiazepine like traits, neuroleptic, hypnotic and antidepressant characteristics. The outcome analysed that aqueous extract does not appear to have benzodiazepine like characteristics hypnotic, neuroleptic effect. The plant extract of *E. hirta* generates a direct action on the central nervous system and also a slight depressant effect [56].

Anti-Venom Activity: Sylvia A. Opiyo (2024) was checked 345 the plant extracts and terpenes with antivenom properties. Here the whole plant extracts of *Euphorbia hirta* show the better activity against *N. naja*. The final result from this study shows that plant possess potent anti-venom activity and could provide an alternative way to inhibit venom toxins in snakebite [57].

Analgesic and Antianaphylactic Activity: The ethanolic extract of *E. hirta* was initiated to have a familiar anti-anaphylactic activity. Alike span of dose, EH-A001 inhibited passive cutaneous hypersensitivity in rat and active paw hypersensitivity in mice. The removal outcome of EH-A001 was observed to free the TNF-α and IL-6 from anti-DNP-HAS activated rat peritoneal mast cells. The data appeared that the *E. hirta* constrain passive cutaneous anaphylaxis in rat and active

paw anaphylaxis in mice. The result also showed an elimination effect on IL-6 and TNF-α release from anti-DNP-HSA activated rat peritoneal mast cells. So, Youssouf *et al,* 2007 demonstrate anti-anaphylactic effect of *E. hirta* [58].

Synergistic Property: Synergistic activity was done to determine *in-vitro* activity of erythromycin, and *Euphorbia hirta* leaves methanolic decoctions in combination against *Staphyllococcus aureus*. The results showed that some combination of *Euphorbia hirta* leaves and erythromycin resulted in synergistic effects [59].

Water Consumption Property: The activity of the plant decoction was examined in an animal model. Intraperitoneal administration of 10 mg/100 kg body weight of the decoction significantly ($P< 0.05$) decreased the amount of water consumed by the animals, and the activity lasted for 2 hrs [60].

Antithrombocytopenic Activity: Antithrombo-cytopenic effect of lyophilisation decoction of *E. hirta* Linn was deliberated by Jovencio Apostol *et al,* 2012 in Sprague-Dawley rats. Ethanol induced thrombocytopenia in less than 7 days in rats. Clotting time, bleeding time and platelet count was examined in four groups of rats.

A remarkable increase in platelet count, decrease bleeding time and clotting time are checked after *E. hirta* treatment. Histology conduct shows a decrease in liver sinusoid dilation in *E. hirta* treated groups. *E. hirta* decoction, so it acts as potential antithrombocytopenic [61].

CONCLUSION: In this review of *Euphorbia hirta*, an abstract of its flavonoid, anti-oxidant activity, antitumor activity, anti-diabetic activity, diuretic activity, anti-bacterial activity, anti-diarrheal activity, anti-allergic activity, were analysed in particular.

Characteristics enhanced in this review will additionally help in exploring more about other properties related with it. Some parts of the plant have fascinating antimicrobial, anti-tumor, anti-oxidant and antidiabetic properties. So, additional examine on this plant should be observed by researchers in phytochemistry and pharmacology in discovering new and possible bioactive compounds such as anticancer, antioxidants and antidiabetic.

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