INTERNATIONAL RESEARCH JOURNAL OF PHARMACY **ISSN 2230 – 8407**
Available online http://www.irjponline.com
Review Article

EUPHORBIA NERIIFOLIA LINN: A PHYTOPHARMACOLOGICAL REVIEW

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Article Received on: 17/03/2011 Revised on: 19/04/2011 Approved for publication: 11/05/2011

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ABSTRACT
Euphorbia neriifolia is an herb extensively used in the Indian system of medicine; it is a small deciduous tree of the family Euphorbiaceae. As a tree having number of branches so as Neriifolia having tremondous uses. As traditional medicine the plant is useful in abdominal troubles, bronchitis, tumors, leucoderma, piles, inflammation, and enlargement of spleen, anemia, ulcers, and fever and in chronic respiratory troubles. The plant is reported to contain sugar, tannins, flavonoids, alkaloids and triterpenoidal saponin etc.The plant has been reported to have analgesic, hepatoprotective, immunostimulant, anti-inflammatory, mild CNS depressant, wound healing Radioprotective. It is now considered as a valuable source of unique natural products for development of medicines against various diseases and also for the development of industrial products. This review gives a bird's eye view mainly on the pharmacognostic characteristics, traditional uses, phytochemistry and pharmacological actions of the plant *Euphorbia neriifolia.*

KEYWORDS: *Euphorbia neriifolia*, pharmacological activities, phytochemistry, traditional uses.

INTRODUCTION

In recent era of globalization, Medicinal plants have attracted global interest. Now a day medicinal plants are part and parcel of human society to combat diseases, from the dawn of civilization[1]. Medicinal plants have been of great importance to the health care needs of individuals & Communities. In developing countries the use of herbal preparations made from medicinal plants is widely used[2]. Medicinal herbs are moving from fringe to mainstream use with a greater number of people seeking remedies and health approaches free from side effects [3]. According to the World Health Organization, 2003 about 80% of the population of developing countries are unable to afford pharmaceutical drugs, so they goes to plant based medicines to sustain their primary health care needs[4]. Because of their wide biological and medicinal activities, higher safety margins and lesser costs Herbal medicines are in great demand in the developed as well as developing countries for primary healthcare[3, 4] .India has an officially recorded list of 45,000 plants species and estimation put the list of 7500 species of medicinal plants growing in its 16 agroclimatic zones under 63.7 million hectares of forest coverage[5]. In the past few decades, pioneer's work in identification, documentation and recognition of traditional medicine was done in India. Investigation of traditional medicine is very important for the welfare of rural and tribal communities for the treatment of various diseases[6] .Herbal formulations are widely accepted therapeutic agents as anti-diabetics, anti-arthritics, aphrodisiacs, hepatoprotective, cough remedies, memory enhancers and adaptogens.*Euphorbia neriifolia Linn.* (Euphorbiaceous) was selected for review because of wide verities of uses in traditional medicine, thorough literature survey, to match the claimed therapeutic potentials of various scientists on this plant.The specific name, neriifolia, means "Leaves like an oleander." The present attempt is to review and compile updated information on various aspects of *Euphorbia neriifolia* Linn.

LOCAL NAMES

Common milk hedge (Eng.). Bait (Pamp. Tag.); karimbuaya (Ilk.); lengua de perro (Sp.); soro-soro (Tag.); sorog-sorog (Pamp. Tag.); sudu-sudu (P.Bis.);

VERNACULAR NAMES OF *EUPHORBIA NERIIFOLIA*

Malaysia: Sesudu
English: Common Milk Hedge, Hedge euphorbia, oleander spurge
Thailand: Som chao (Central)
Phillipines: Carambuaya, Karimbuaya, Sobog-sobog, Sobo-soro, Sorogsorog
Burma: Thassaung, Thazavn-mina
India: Snoohi, Vajra, Vijri, Patrasnuk, Svarasana (Sanskrit); Sehund, Sij, Patton-ki-send, Thohar (Hindi); Mansasij, Hij-daont, Patasij (Bengali) l Akujumudu (Telagu) l Haikkali (Tamil)
Arabic: Dihu Minguta[7].

CLASSIFICATION DETAILS OF *EUPHORBIA NERIIFOLIA*

Division	: Magnoliophyta
Class	: Magnoliopsida
Subclass	: Eurosid I
Order	: Malpighiales
Family	: Euphorbiaceae
Subfamily	: Euphorbioideae
Tribe	: Euphorbieae
Sub Tribe	: Euphorbiinae[8]

ORIGIN AND DISTRIBUTION

The specific name, neriifolia, means "Leaves like an oleander."There are over 1500 species of Euphorbias' family in the world ranging from annual weeds to trees. Neriifolia Linn. (Euphorbiaceae) grows widely around the dry, rocky and hilly areas of North, Central and South India. E. Neriifolia is an herb full of spine, popularly known as 'sehund' or 'thohar' in Hindi. It is also called Milk Hedge in English. The leaves are thick succulent, 6-12 inches long, ovular in shape[9, 10, 11]. *Euphorbia neriifolia* is an erect shrub, 4 m tall, base diam.6 cm,fleshy and slightly succulent, spiny, branching, usually with terminal leaves; stem and branches without articulation, base nearly terete,or otherwise with 5 indistinct angles (not winged) and spine-shields in 5 distinct rows, younger branches c. 15 mm in diam., sinuses between spine-shields shallow to absent. Spine-shields 2-3 cm apart, spines in pairs, 2 mm long, grey-brown to blackish, persistent but Indumentums are absent. Stipules transformed into spines. Leaves sub sessile, obviate in shape 10-18 by 3-4 cm, base attenuate, margin entire, apex rounded, persistent during the vegetation period. Cyathia not seen in Thailand, outside of Thailand arranged in axillary groups of 3, the central one subsessile, the lateral ones with a peduncle of 6-7 mm, bracts 4 mm long, cyathial glands 5, 1 by 3 mm. Flowers and fruits not seen[12].

MORPHOLOGY

Soro-Soro is another name of Neriifolia it is cultivated in gardens, and is apparently nowhere spontaneous. It also occurs in India to Malaya, probably introduced in the latter region. This is a shrubby, erect, branched, fleshy, cactus like plant, 2 to 4 meters high, the trunk and older branches being grayish and cylindrical; the medium branches being slightly twisted, stout, fleshy, and 4 or 5 angled or winged; the younger ones usually 3-winged, the wings lobulate, with a pair of stout, sharp, 2- to 4-millimeter-long spines rising from the thickened bases at each leaf or petiole-scar. The leaves arise from the sides of wings towards the end of the branches, are fleshy, oblong-obovate, 5 to 15 centimeters long, or in young plants somewhat longer, painted or blunt at the tip. The cymes are short, solitary in the sinuses, and usually of 3 involucres.The "Indian Spurge Tree" is one of the three large growing euphorbias native to India. The other two are royleana and nivulia.*Euphorbia neriifolia* will grow to a small tree at maturity, with Cylindrical or five-angled stems. It branches frequently, with branches curving upward, several inches thick; with just a hint of spiraling angles.The paired spines are short and black. The fleshy or leathery deciduous leaves are 3-5 inches long. This plant needs a very porous potting mix. It also should be watered at least weekly during the growing season. It is reportedly very prone to mealy bugs, so it should be checked frequently in order that any infestation can be caught before heroic counter measures have to be taken. If you do have to resort to a bug spray, be forewarned that most of the leaves will probably drop. This can weaken the plant and might lead to rot. As is true with most crested plant forms, a crest of E. neriifolia should be shielded from the full all-day summer sun in our area[12].

TRADITIONAL USES

Traditionally there are very many uses of this plant.Leaves are used as aphrodisiac, diuretic, cough and cold, and also used in the treatment of bronchitis, bleeding piles, ano-rectal fistula. The tribal population of Chhattisgarh region in India uses the milky latex as an ingredient of aphrodisiac mixture. Latex is used to defrost skin warts, ear ache and in arthritis. The wound healing process of latex (aq.extract) of *Euphorbia neriifolia* is evidenced by increase in tensile strength, DNA content, epithelization and angiogenesis. Plants is bitter, laxative, carminative, improves appetite,useful in abdominal troubles, bronchitis, tumors, leucoderma, piles, inflammation, enlargement of Spleen, anemia, ulcers, fever and in chronic respiratory troubles[11,12]. Because of its purgative action it is used to treat obstinate constipation. It is also used in the treatment of anal problems like haemorrhoids and fistula-in-ano. There are many different ways whereby these conditions are addressed; one is by mixing turmeric powder with the latex and applying it over the lesion, another is by steaming the leaves, crushing it and then applying over the lesion. The Indians use the roots as antispasmodic, the root mixed with black pepper is applied to cure snake bites[13].The latex is used to remove warts by directly applying it over the lesion. The juice expressed from the heated leaves is a remedy for otalgia and otitis. It is the first choice of drug in the treatment of earache amongst the Malays. In Sarawak instead of squeezing the juice out of the leaves they simply rolled the leaves insert it into the ear canal and blow air through it[14].The root and pulp of the stem is considered antiseptic. The

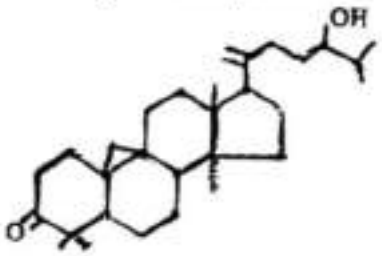
antibacterial activity had been taken advantage of by traditional practitioners as seen in its application for treatment of ulcers, dressing of wounds and treating anal fistula[14]. The latex is also prescribed by Shusruta for obstinate skin diseases, urinary disorders including diabetes[14].In order to detoxify the latex: 1 tola of leaf juice of amlika, after being filtered through a cloth is mixed into 2 palas of the milky juice[15].

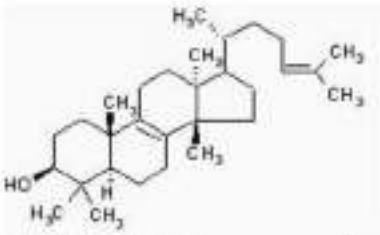
PLANT PART USED

Whole plant including the latex[13]

CHEMICAL REVIEW

Euphol, monohydroxy triterpene, nerifoliol, taraxerol, beta-amyrion, glut-5-(10)-en-1-one, neriifolione, cycloartenol.Phytochemical investigations on *Euphorbia neriifolia* yielded in the isolation of several classes of secondary metabolites, many of which expressed biological activities such as triterpenes (nerrifolione), flavonoids and steroidal saponins. E. neriifolia predominantly contains sugar, tannins, flavonoids, alkaloids and triterpenoidal saponin[16].





9, 9-cylolanost-20(21) ene-24-ol 8, 24-euphadien- 3 beta-ol -3-one (neriifolione)

PHARMACOLOGICAL ACTIVITY

Hepatoprotective activity

Now day's Hepatic damage mainly due to the viral infection is common problem. There is hardly any remedy available in the modern system of medicine, including corticosteroids and immunosuppressive agents which bring about symptomatic relief supporting only the process of healing or liver regeneration. Hence increasing attention is being given to plant recommended for the treatment of hepatic disorders in the traditional system of medicine[17].

Papiya Bigoniya et al. (2010) investigated the hepatoprotective effect of saponin fraction isolated from the leaf of *Euphorbia neriifolia* on CCl_4-induced hepatotoxicity on rat. CCl_4 (1.5 mg/kg, i.p) is a potent hepatotoxic agent, which induces peroxidative degeneration of membrane lipids causing hypoperfusion of the membrane.During the study they fond that Cytosolic enzymes like SGPT, SGOT and ALP elevates in the blood and hepatic glutathione and SOD decreases. The hepatoprotection of triterpene was compared with silymerin, a well known standard hepatoprotectant. Euphol was isolated from E. Neriifolia leaf total sapogenin fraction after separation and instrumentation.Pretreatment with total saponin fraction (50, 125 and 175 mg/kg, p.o once a day for 4 days before CCl4 and continued further for 3 days) attenuated[18].

Anti-Inflammatory and Analgesic Activity

An inflammation is characterized by pain, fever, redness and wheel. It has different steps; the first step is caused by an increase in vascular permeability, the second one by infiltrate of leucocytes and the third one by granuloma formation.

Kalpesh Gaur had observed the anti-inflammatory and analgesic activity of 70% v/v hydro-alcoholic extract of dried leaves of *Euphorbia neriifolia* by oral administration at dose of 400 mg/kg/day of body weight to healthy albino rats .The hydro-alcoholic extract was also evaluated for analgesic activity using Eddy's hot plate method and tail-flick method in albino rats. It showed significant ($P<0.05$) reduction in the carrageenan-induced paw edema in rats and analgesic activity evidenced by increase in the reaction time by Eddy's hot plate method and tail-flick method in albino rats. The hydro-alcoholic extract alsoshowed a greater anti-inflammatory and analgesic effect when compared with the standard drugs, indomethacin and diclofenac sodium respectively. The present observation indicated significant ($P<0.001$) activity of the hydro-alcoholic extract of *Euphorbia neriifolia* in the treatment of inflammation and pain[19].

Anti-inflammatory activity of latex of Euphorbia plants was investigated by Papiya Bigoniya (2010).by carrageenan induced rat paw edema method. Topical anti-inflammatory activity of latex pet. Ether fraction at 750 and 500 mg/ml dose showed 42.40 and 35.25 % inhibition of carrageenan induced paw edema in comparison to 71.22 % inhibition of topical diclofenac sodium (100 mg/ml). It was recognized that anti-inflammatory substances which exerts their effect due to their irritant property can be distinguished from the true anti-inflammatory agents by administering them locally in the carrageenan test. If a mixture of the plant extract and carrageenan produces reduction in paw edema, the effect of the plant extract are not due to counter irritant activity. It has long been thought that pain can be relieved and healing promoted by irritating an area of the

skin. Body initiates an inflammation in response to trauma; this is red swollen and sore event that occurs on injury or infection. Pet. Ether fraction contains triterpenes euphol, nerifoliol and cycloartenol having Antiinflamatory and Analgesic activity. This study explores safe topical use profile of E. Neriifolia latex retaining its anti-inflammatory efficacy[20].

Antioxidant activity

Oxidation is basic cause of diseases in human being because it produces free radicals so there is need of antioxidant agent.

P. Bigoniya and A.C. Rana et al found out the effect of sub-acute administration of *Euphorbia nerifolia* Leaf extract on some haematological, biochemical, histological and antioxidant enzyme status of rat liver and kidney following 21 and 45 days treatment. The animals were observed for gross physiological and behavioral responses, food and water intake and body weight changes. Free radical scavenging activity and histopathology was done on liver and kidney samples. *Euphorbia nerifolia* extract treatment extreme significantly ($p< 0.001$) reduced serum lipid profile along with glucose establishing its catabolic property. E. neriifolia showed an extremely significant ($p < 0.001$) rise in liver and kidney SOD along with liver catalase and decrease in liver lipid peroxidation. These features indicate that E. neriifolia up to 400 mg/kg daily dose is safe and has potential to be consumed for long time in management of various diseases[21].

Immunomodulatory Activity

Immunity is capacity of human body to resist disease .Modification of the immune response through stimulation or suppression, help in maintaining a disease-free state. The agents that an Improve host defence mechanism in the presence of an impaired immunity is better therapy than conventional chemotherapy[22]. Immunostimulation in a drug-induced immunosuppression and immunosuppression in an experimental hyper-reactivity model by the same preparation can be called as true immunomodulation[23]. The modulation of immune response with the aid of various bioactive in order to improve certain diseases is an active area of interest. The property of any substance to enhance non-specific resistance of body against pathogens is termed "adaptogenic". This is an important region of research in which we do not have any breakthrough, which is used in vaccination program or immunosuppressant and which can be safely used in organ transplantations and autoimmune diseases. Various plant products are widely used for their immunomodulating activity[24].The presence of immunostimulant compounds in various plants were reviewed but only a limited amount of immunosuppressive products of plants had reported. The products, which are well tolerated by the patient, may be developed as an alternative in the treatment of disorders caused by an exaggerated or unwanted immune response, such as in autoimmune diseases, allergies, glomerulonephritis, chronic hepatitis, etc[25].

Kalpesh Gaur et al determined the immunomodulatory activity of 70%v/v hydro-alcoholic extract of dried leaves of *Euphorbia neriifolia* by oral administration at dose of 400 mg/kg/day of body weight to healthy albino rats divided into four groups consisting of six animals each. The determination of immunomodulatory activity was done by testing the survival rate of rats against abdominal sepsis caused by E.Coli.Also determination of hematological parameters & phagocytic index was determined by carbon clearance method. The humoral immune responses was determined by haemagglutination antibody titre method and cellular immune responses determined by footpad swelling method. The hydro-alcoholic extract of *Euphorbia neriifolia*, possessing significant protection against E.Coli induced abdominal sepsis, significant increase in total leucocyte count, differential leucocyte count and phagocytic index was determined. It remarkably potentiates haemagglutination antibody titre and cell mediated immunity by facilitating the footpad thickness response in normal and Betamethasone induced immunosupressed rats[26].

Radioprotective and In-Vitro Cytotoxic Sapogenin from *Euphorbia neriifolia* (Euphorbiaceae) Leaf

Papiya Bigoniya Confirmed The sapogenin exerted moderate antioxidant activity with highly significant ($p < 0.001$) reduction of gamma radiation-induced chromosomal aberrations (33.5 % compared to 71.5 % for radiation treatment alone at 4 Gy). It also exhibited cytotoxic activity on melanoma cell lines (IC50 = 173.78 µg/ml). The sapogenin fraction showed antioxidant, radioprotective and cytotoxic activities. This study provides a scientific basis for the claimed traditional anticarcinogenic potentials of E. neriifolia. Euphol was isolated as a major constituent from the triterpenoidal sapogenin fraction of *Euphorbia neriifolia* leaf. Its in-vitro antioxidant activity was evaluated by reducing power assay, 1, 1 – diphenyl –2-picryl hydrazyl (DPPH) assay, as well as hydroxyl radical and superoxide radical scavenging activities.Radioprotective activity was assessed against radiation-induced chromosomal aberrations and cytotoxicity on murine F1 B16 melanoma. E. neriifolia Leaf is rich in crude sapogenin, and euphol (0.023 %) was identified as a major constituent. The sapogenin fraction showed antioxidant, radioprotective and cytotoxic activity against malignant

melanoma cells. Our study supports the use of *Euphorbia neriifolia* as an antitumour herbal remedy in Indian traditional medicine. This study reports for the first time the potential anticancer properties of E. neriifolia triterpenes. However, the sapogenin content needs to be studied further to isolate other active constituents and to elucidate its in-vivo anticancer activity profile; this further work is in progress in our laboratory[27]

The ethyl acetate extract of E. neriifolia showed significant cytotoxicities against the following cell lines: Lewis lung carcinoma, B16F10 melanoma and SW480 human colon adenocarcinoma in a dose dependent manner[28].

In Vitro Free Radical Scavenging and Antioxidant Activity

A part of the oxygen taken into living cells is changed to several harmful reactive oxygen species (ROS). ROS, are highly reactive molecules which include free radicals such as superoxide ions (O2-),hydroxyl radicals (OH-), nitric oxide radical (NO), singlet molecular oxygen peroxynitrite radicals and hydrogen peroxide (H2O2)[29,30].Superoxide anion radical (O2.) is one of the strongest reactive oxygen species among free radicals that are generated first after oxygen is taken into living cells[30]. All these radicals exert oxidative stress towards the cells of human body and this leads to a number of physiological disorders such as atherosclerosis, arthritis, ischemia, Reperfusion injury of many tissues, central nervous system injury, gastritis, cancer and AIDS[31,32]. In treatment of these diseases, antioxidant therapy has gained an immense importance. There are some synthetic antioxidant compounds, such as butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), propylgallate (PG) and tertiary butylhydroquinone (TBHQ) are suspected to have some toxic effects such as carcinogenicity[33].Therefore, research for the determination, development and utilization of more effective antioxidants of natural origin is desired. The medicinal plants (Rasayana) are the plants whose parts (leaves, seeds, stems, roots, fruits, foliage etc.) extracts, infusion, decoctions, powders have been extensively used in the Indian traditional (Ayurveda) system of medicine for the treatment of different diseases of humans. Medicinal properties of plants have also been investigated in the light of recent scientific developments throughout the world, due to their potent pharmacological activities, low toxicity and economic viability, when compared with synthetic drugs.

Veena Sharma et al found that the *Euphorbia neriifolia* possesses the significant antioxidant activity compared to other well characterized, standard antioxidant systems in vitro and could serve as free radical inhibitors or scavengers, acting possibly as primary antioxidants, which might be due to the presence of alkaloids, tannins, flavonoids, proanthocynidin and sapogenin. These finding suggest that this plant is a potential source of natural antioxidant that could have great importance as therapeutic agents in preventing or slowing the progress of ageing and age associated oxidative stress related degenerative diseases such as cancer and various other human ailments. Further studies are warranted for the isolation and characterization of antioxidant components and also in vivo studies are needed for understanding their mechanism of action as an antioxidant better[34].

Activity in Abscess

Dilip kalita et al shows activity of *Euphorbia neriifolia* in abscess Stem exudates of Hiju, *Euphorbia neriifolia* Linn. (Euiphorbiaceae) and leaf exudates of Pategoja, kalanchoe pinnata (Lam.) Pers. (Crassulaceae) are used by Kalitas by applying over the affected area three times a day for three days. Leaf extract of Jatuka, Lawsonia inermis Linn. (Lithraceae) after slightly boiling is applied over the affected areas thrice daily until cure[35].

Acting against Heterometrus Laoticus Scorpion Venom Activity on Fibroblast Cell Lysis

Scorpions are widely found in the world. There are 1500 species and approximately 25 species are dangerous to humans especially in children and the elderly. Thus, envenomation by scorpion remains a serious health problem especially in tropical countries. Their venoms contain toxins affecting ion channels, mainly sodium and potassium.

Nunthawun Uawonggul studied the aqueous extracts of 64 plant species, listed as animal- or insect-bite antidotes in old Thai drug recipes were screened for their activity against fibroblast cell lysis after Heterometrus laoticus scorpion venom treatment. The venom was preincubated with plant extract for 30 min and furthered treated to confluent fibroblast cells for 30 min. More than 40% efficiency (test/control) was obtained from cell treatment with venom preincubated with extracts of Andrographis paniculata Nees (Acanthaceae), Barringtonia acutangula (L.) Gaertn.(Lecythidaceae), Calamus sp. (Palmae), Clinacanthus nutans Lindau (Acanthaceae), *Euphorbia neriifolia* L. (Euphorbiaceae), Ipomoea aquatica Forssk (Convolvulaceae), Mesua ferrea L. (Guttiferae), Passiflora laurifolia L. (Passifloraceae),Plectranthus amboinicus (Lour.) Spreng. (Labiatae), Ricinus communis L. (Euphorbiaceae), Rumex sp. (Polygonaceae) and Sapindus rarak DC. (Sapindaceae), indicating that they had a tendency to be scorpion venom antidotes. However, only Andrographis paniculata and Barringtonia acutangula extracts provided around 50%

viable cells from extract treatments without venom preincubation. These two plant extracts are expected to be scorpion venom antidotes with low cytotoxicity[36].

Wound healing activity

Surgically produced cutaneous wound when treated with topical application of 0.5% and 1.0% sterile aqueous solution of the aqueous extract of the latex of E. Neriifolia showed facilitated healing process as evidenced by the increase in tensile strength, DNA content, epithelisation and angiogenesis.E. Neriifolia is easily available in large quantity in the dry hilly areas of North and Central India. This plant can be used as a cheap source of active therapeutics as Propagation of these plants is easy and cheap which can be grown in large number with very less expenses. E. Neriifolia latex showed wound healing activity in guinea pig by increasing epithelization, angiogenesis, tensile strength and DNA content in wounds[37].

Diuretic activity

Decrease in Urine volume, and GFR rate will lead to Increase in toxic Metabolites of drugs and waste material of body. Also it will lead to retention of Sodium in body which will be harmful for hypertensive patient. Papiya Bigoniya had studied that E. neriifolia leaf extract produces potent diuresis, increasing the urine volume three times than the control by increasing urine sodium and chloride concentration along with water[38].

Urine output along with electrolyte concentration

Animals were deprived of food and water for 16 hours. All the rats received priming dose of normal saline 25 ml/kg orally. Immediately after administration of vehicle, different doses of extract and standard drug frusemide (5 mg/kg, p.o) all the rats were placed in metabolic cages (group wise) specially designed to separate urine and faeces at room temperature of 25±0.5°C (23). The urine was collected in measuring cylinder up to 5 h after drug administration. During this period no food and water was made available to animals. Concentration of Na+ and K+ in urine was measured by Flame photometer (Elico, India). Chloride ion concentration was estimated by titration with silver nitrate solution (N/50) using 3 drops of potassium chromate solution as indicator.

Antiulcer Activity

Papiya Bigoniya Studied models for antiulcer study as follows,

Loric ligation-induced gastric ulceration

Under light ether anesthesia, the abdomen was opened by a small midline incision of 1 cm below the xiphoid process. Stomach was exposed and a tight knot was applied around the pyloric sphincter. The stomach was placed carefully and abdomen wall closed by interrupted sutures. Vehicle, ranitidine (20mg/kg) and test extract were administered orally 15 min before pyloric ligation. After 4 hours animals were killed by decapitation, abdomen was opened and the stomach was isolated after suturing the lowed esophageal end. The stomach was then cut open along the greater curvature and ulcer index was determined using a hand lens. Gastric contents were collected in a graduated centrifuge tube, volume measured, pH determined, centrifuged at 1000 RPM for 10 min and subjected to biochemical analysis[38].

Antidiarrhoeal Activity

Castor oil-induced diarrhoea on rats

Modified Awouters et al method. 24 hr fasted animals were treated with vehicle, standard drug (loperamide 0.5 mg/kg) and different doses of extract. After 1 h, each animal received 1 ml of castor oil orally and was then observed for defecation placing them in separate cages up to 6 h. The consistency and frequency of faecal matter, and the number of respondents were noted on filter papers placed beneath the perforated metal cages. Purging index (PI) was calculated as follows. Purging index (PI) = % respondent x average no of stools/average latent period[38].

Psychopharmacological activity

In a study done on the pharmacological activities of the leaf extract of E. neriifolia the investigators found that the leaf extracts has anti-anxiety, anti-psychotic and anticonvulsant activities in mice and rats[39].

Antibacterial activity

Ethanol extract of leave and petroleum ether extracts of the pods of E. neriifolia were tested for their antibacterial activities against Pseudomonas aeruginosa, Staphylococcus aureus and Escherichia coli. The results showed that these extracts were more effective in inhibiting E. coli growth than for P. aeruginosa and S. aureus[40].

CONCLUSION

From the thorough study and investigation of the available literature of *Euphorbia neriifolia* clearly shown that the plant serves as an important source of many therapeutically efficient chemicals. *Euphorbia neriifolia is* an herb extensively used in the Indian system of medicine, is a small deciduous tree of the family Euphorbiaceae. As traditional medicine the plant is useful in abdominal troubles, bronchitis, tumors, leucoderma, piles, inflammation, enlargement of spleen, anemia, ulcers, fever and in chronic respiratory troubles. E. neriifolia predominantly contains sugar, tannins, flavonoids, alkaloids and triterpenoidal saponin. The plant reported to have mild CNS depressant, wound healing and immunomodulatory activity of leaf hydro alcoholic extract. Saponin separated from E. neriifolia

leaf posses good hemolytic and in-vitro antioxidant activity.

As E. Neriifolia has been successfully used in many health problems since a long time it provides a wide area of interest for the research purposes in development of newer drug molecules. E. Neriifolia is drug of choice for multiple diseases so theirs need to develop various dosage forms using this plant.

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Fig 1 - *Euphorbia neriifolia* Linn.