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Pharmacological actions and therapeutic benefits of *thuhar (Euphorbia neriifolia): A review*

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Abstract

Thuhar (Euphorbia neriifolia) is a drug of herbal origin, which has been a part of traditional healthcare in most parts of the world for thousands of years. *Thuhar* is a milky or latex (*sheer dar nabat*) type of herbal origin drug. In Unani classical literature there are many variety of *thuhar* is mentioned such as *danda thuhar*, *nadhara thuhar*, *chaudhara thuhar*, *unglia thuhar*, *nagfhani thuhar*. The specific name, *neriifolia*, means “Leaves like an oleander.” There are over 1500 species of *Euphorbia*’s’ family in the world ranging from annual weeds to trees. *Euphorbia neriifolia* is an herb full of spine, popularly known as ‘*Sehund*’ or *Thuhar*. It is also called milk hedge in English. As a significant medicinal plant, the traditional use of *Euphorbia neriifolia* for curing many diseases has a long history as effectively been employed for the treatment of various ailments like *hudar* (rheumatism) *irqunnisa* (sciatica) *niqrous* (gout) *warm-e-shobatein* (bronchitis) *warm-e-tihal*, *waja-ul-uzn* (otalgia), *iltehab* (inflammatory conditions), *zeeq-un-nafs* (asthma) *bars* (leucoderma) etc.. In this paper, an effort has been made to compile the actions and therapeutic uses of *Thuhar (Euphorbia neriifolia)*

Keywords: *Thuhar, Euphorbia neriifolia*, anti-inflammatory herb

1. Introduction

Thuhar (Euphorbia neriifolia) is a drug of herbal origin, which has been a part of traditional healthcare in most parts of the world for thousands of years. The specific name, *neriifolia*, means “Leaves like an oleander.” There are over 1500 species of *Euphorbia*’s’ family in the world ranging from annual weeds to trees. *Euphorbia neriifolia* is an herb full of spine, popularly known as ‘*sehund*’ or *thuhar*. It is also called milk hedge in English. As a significant medicinal plant, the traditional use of *Euphorbia neriifolia* for curing many diseases has a long history has effectively been employed for the treatment of various ailments like *hudar* (rheumatism) *irqunnisa* (sciatica) *niqrous* (gout) *warm-e-shobatein* (bronchitis) *warm-e-tihal*, *waja-ul-uzn* (otalgia), *iltehab* (inflammatory conditions), *zeeq-un-nafs* (asthma) *bars* (leucoderma) etc. (Ahmed *et al.*, 2011; Kabiruddin, 2000; Hakeem,2002; Sharma *et al.*,2011; Kirtikar and Basu, 2005; Anonymous,1992) [1, 2, 3, 5, 6, 17].



Leaf of *Thuhar*

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Vernacular Names

Arabic:	Azfurzukkum, Jauarulkalb
Bengali:	Hijdaona, Manasij, Patashij
Bombayese:	Minguta, Newarang, Thor
Burmese:	Shasaung, Shasoung, Shazawnminna Zizaung
Canarese:	Elagalli, Yelakali
Deccan:	Kuttekkijibhkapatta, Kuttekkijbhkasend
Gujrati:	Thor tuaria
Hindi:	Pattonkisend, Sehund, Sij, Thohar
Ilocano:	Carambuaya,
Konkani:	Nivelkantam, Nivelkanti
Malyalam:	Ilakalli, Kalli
Marathi:	Mingut, Nevagunda, Newrang
Pampangan:	Bait, Sorogsorog, Sosoro
Tamil:	Ilaikkalli, Kalli, Manjevi, Nadangi, Naynakki
Telugu:	Akujemudu
Tulu:	Irekalli
Urdu:	Zaqoom
Uriya:	Siju

(Ibn Baitar, ynm; Kirtikar and Basu, 2005; Anonymous, 1992; Ghulam, 2007; Kabiruddin, 2000; Nadkarni, 2007; Ahmed *et al.*, 2011; Sharma *et al.*, 2011) ^[1, 2, 5, 6, 9, 17].

Description according to unani classical literature

Thuhaar is a milky or latex (*sheerदार nabat*) type of herbal origin drug. In Unani classical literature there are many variety of *thuhaar* is mentioned such as *danda thuhaar*, *nadhara thuhaar*, *chaudhara thuhaar*, *unglia thuhaar*, *nagfhani thuhaar* etc.

The author of *Makhzanul mufradat* (Kabiruddin) mentions about three varieties of the drug:

1. *Danda thuhaar* with round stem and leaves.
2. *Tadhara thuhaar* with triangular leave and stem.
3. *Chaudhara thuhaar* with quadngular leaves and stem.

Parts Used

Leaves, Latex, Root, Stem and pulp of stem. (Kabiruddin, 2000; Ahmed *et al.* 2011; Panda, 2000; Kirtikar and Basu, 2005; Nadkarni, 2007; Anonymous, 2007; Anonymous 2001) ^[1, 2, 5, 9, 10].

Mizaj

Hot 3⁰ and Dry 3⁰ (Ghulam, 2007; Kabiruddin, 2000; Anonymous, 2007) ^[2, 11]

Dosage

Leaves 520 mg (Ghulam, 2007; Anonymous, 2007) ^[11]
Milk ½ to 1 drop (Kabiruddin, 2000; Anonymous, 2007) ^[2, 11]

Actions

Action	Reference
<i>Hazim</i> (Digestive)	Hakeem, 2002 ^[3] ; Kabiruddin, 2000 ^[2]
<i>Jali</i> (Detergent)	Hakeem, 2002 ^[3] ; Khan, 1273
<i>Kasir-e-Riyah</i> (Carminative)	Ghulam, 2007; Hakeem, 2002 ^[3] ; Kirtikar and Basu, 2005; Khan, 1313
<i>Munawwim</i> (Delirium)	Kirtikar and Basu, 2005
<i>Mohallil-e-Waram</i> (Resolvent)	Ghulam, 2007; Hakeem, 2002 ^[3] ; Kabiruddin, 2000 ^[2] ; Anonymous, 2007 ^[11]
<i>Mohammir-e-Jild</i> (Rubrfacient)	Kabiruddin, 2000 ^[2] ; Anonymous, 2007 ^[11] ; Kirtikar and Basu, 2005; Nadkarni, 2007 ^[9]
<i>Munaffis-e-Balgham</i> (Expectorant)	Kabiruddin, 2000 ^[2] ; Anonymous, 2007 ^[11]
<i>Musakkin-e-Hararat</i> (Febrifuge)	Kirtikar and Basu, 2005; Khan, 1313
<i>Mus'hil</i> (Purgative)	Kabiruddin, 2000 ^[2] ; Kirtikar and Basu, 2005
<i>Muqarreh</i>	Anonymous, 2007 ^[11] ; Khan, 1313
<i>Mushtahi</i> (Appetizer)	Kirtikar and Basu, 2005
<i>Mulayyin</i> (Laxative)	Kirtikar and Basu, 2005
<i>Musakkin</i> (Analgesic)	Kirtikar and Basu, 2005 ^[5] ; Khan, 1313

Therapeutic Uses

Clinical Indication	Reference
Aatishak (Syphilis)	Ghulam, 2007; Kabiruddin, 2000 ^[2] ; Nadkarni, 2007 ^[9] ; Anonymous, 2007 ^[11]
<i>Amraz-e-Jild</i> (Skin disease)	Kirtikar and Basu, 2005
<i>Azm-e-Tihal</i> (Splenomegaly)	Kirtikar and Basu, 2005
<i>Azm-e-Kabid</i> (Hepatomegaly)	Nadkarni, 2007 ^[9]
<i>Bars</i> Leucoderma)	Kirtikar and Basu, 2005
<i>Bawaseer</i> (Haemorrhoids)	Kirtikar and Basu, 2005 ^[5]

Daa'd (Eczema)	Hakeem,2002 ^[3] ; Kabiruddin,2000 ^[2]
Faqruddam (Anaemia)	Kritikar and Basu,2005
Falij (Paralysis)	Hakeem,2002 ^[3] ; Anonymous,2007 ^[11]
Humma (Fever)	Kritikar and Basu,2005
Hudar (Rheumatism)	Nadkarni,2007 ^[9]
Isti'sqa (Sciatica)	Hakeem,2002 ^[3] ; Kritikar and Basu,2005; Kabiruddin, 2000 ^[2] ; Anonymous,2007 ^[11]
Juzam (Leprosy)	Hakeem,2002 ^[3] ; Kabiruddin,2000 ^[2] ; Nadkarni,2007 ^[9]
Laqwa (Facial Paralysis)	Kabiruddin,2000 ^[2] ; Anonymous,2007 ^[11]
Niqrous (Gout)	Kabiruddin,2000 ^[2] ; Anonymous,2007 ^[11]
Qoolanj Reehi (Colitis)	Hakeem,2002 ^[3]
Suaal (Cough)	Hakeem,2002 ^[3] ; Kabiruddin,2000 ^[2] ; Anonymous,2007 ^[11]
Sala (Tumour)	Kritikar and Basu,2005
Shaheeqa (Whooping cough)	Nadkarni,2007 ^[9]
Waja-ul-Mufasil (Arthralgia)	Kabiruddin,2000 ^[2] ; Anonymous,2007 ^[11] ; Khan,1313
Warm-e-Shobatein (Bronchitis)	Kritikar and Basu,2005
Warm-e-Tihal	Hakeem,2002 ^[3]
Waja-ul-Uzn (Otagia)	Hakeem,2002 ^[3] ; Kabiruddin,2000 ^[2] ; Kritikar and Basu, 2005; Anonymous,2007 ^[11]
Waja-ul-Asnan (Toothache)	Kritikar and Basu,2005; Kabiruddin,2000 ^[2]
Yarqan (Jaundice)	Hakeem,2002 ^[3] ; Nadkarni,2007 ^[9]
Zeequmafs (Asthma)	Kritikar and Basu,2005; Nadkarni,2007 ^[9] ; Khan,1273
Zof-e-Ishtehe (Loss of appetite)	Kritikar and Basu,2005; Hakeem,2002 ^[3] ; Anonymous,2007 ^[11]
Zof-e-Hazam (Indigestion)	Hakeem,2002 ^[3]

Botanical Description

Habit and Habitat

It is a cactus like plant originated from South Asia and normally grows around dry, rocky and hilly areas of India, in Myanmar, Thailand and Malaysia (Ahmed *et al.* 2011; Samaresh *et al.* 2013; Mansuri *et al.* 2013; Anonymous, 2007) ^[1, 13, 14].

Plant Description

The leaves are thick succulent, 6-12 inches long, ovular in shape. *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 15 mm in diameter, 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. Flowers and fruits not seen. (Ahmed *et al.*, 2011; Sharma *et al.* 2011) ^[1, 18]

Microscopic Examination

Petiole: Transverse section shows a more or less cylindrical outline, cutical present, epidermal cells barrel shaped single layered, trichomes absent, multilayered cortex chlorenchymatous toward periphery and parenchymatous towards stele, cells compactly packed, oval, three closed vascular bundles triangularly arranged, with phloem outside and xylem divided into 5 or 6 radial group of vessels.

Mid rib: Transverse section more or less triangular in outline, epidermis single layered, cells barrel shaped covered by thin cuticle, hypodermis of 5 or 6 layers, polygonal chlorenchymatous, cortical cells parenchymatous, polygonal, compact, concave arc like vascular cylinder centrally situated, vessels thick walled, spirally thickened, phloem cells are also seen.

Lamina: Transverse section shows dorsoventral structure, cutical present, single layered epidermis on both side, trichomes absent, palisade cells one or at places in two layers, stomata absent on upper surface but present on lower epidermis, paracytic, mesophyll cells compactly arranged, 2 to 3 layer, polygonal cells of spongy parenchyma in the lower part. Stomatal index is 8.3 to 12.5, vein islet ratio 5 to 7, palisade ratio 3 to 5 (Anonymous, 2007) ^[11].

Phytochemical Studies

Leaves contain not only primary metabolites including protein, carbohydrate, fat etc. but also diverse secondary metabolites including alkaloids, anthraquinones, glycosides, flavonoids, phenolic compounds, pholobatanins, polyphenol, saponins, steroids, tannins, terpenoids, gums, mucilage, cardenolides etc. (Pokharen *et al.*, 2011; Toume *et al.*, 2012; Yadav *et al.*, 2011; Sharma and Pracheta *et al.*, 2013; Bigoniya *et al.*, 2010) ^[18, 24]. Alkaloid, flavonoids, glycosides, phenol, lignin, saponins, sterols and tannins etc. several secondary metabolites are found in flower measured by different qualitative tests (Leela *et al.* 2013).

Methanolic extract of stem contains alkaloids, flavonoids, cardiac glycosides, saponins, tannins and terpenoids (Samaresh *et al.* 2013) ^[14]. The latex contains 69 to 93.3 % water and water solubles and 0.2 to 2.6% caoutchouc. A gum resin which is the active principle, traces of an alkaloid; wax, caoutchouc, chlorophyll, resin (2.40%), tannin, sugar, mucilage, calcium oxalate, carbohydrates albuminoids, gallic acid quercetin, a new phenolic substance and traces of an essential oil. Latex also contains terpenoids including Cycloartenol, 9, 9- cyclolanost (neriifolione) determined by H-NMR, C-NMR, IR and mass spectra. Affinity chromatography also determined the presence of lectin. (Yadav *et al.*, 2011; Ilyas *et al.*, 1998; Seshagirirao and Prasad, 1995). Presence of calcium is also observed in it (Vimala and Shoba, 2014; Panda H, 1999; Rahman *et al.* 2015) ^[15].

Stem and leaves also contain Euphol, riedelan-3alpha and 3beta-ol, friedoolen- 5-en-1-one, glut-5-en-1-one and taraxerol. Bark and root also contain n-hexacosanol,

euphorbol, hexacosanoate, 12-deoxy-4beta-hydroxyphorbol-13-dodecanoate-20-acetate and pelargonin-3,5- diglucoside, 24-methylenecycloartenol and tulipalin-3,5-diglucoside, nerifoliol, cycloartenol, euphorbol, ingenol triacetate, 12-deoxyphorbol-13, 20-diacetate, delphinidin-3,5-diglucoside (Rahman *et al.*, 2015).

Physico-Chemical Properties

Physical Constituents	Values
Foreign matter	Not more than 2 %
Total Ash	Not more than 16 %
Acid-insoluble Ash	Not more than 2 %
Alcohol-soluble extractive	Not less than 9 %
Water-soluble extractive	Not less than 20 %

(Sharma *et al.* 2011; Anonymous 2007; Anonymous 2001) [18]

Pharmacological Studies

Anti-inflammatory and Analgesic Study

Kalpesh *et al.*, (2009) observed the anti-inflammatory and analgesic activity of 70% v/v hydro-alcoholic extract of dried leaves of *Euphorbia nerifolia* 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 also showed a greater antiinflammatory and analgesic effect when compared with the standard drugs, Indomethacin and Diclofenac sodium respectively. The present observation indicated that the significant ($P < 0.001$) activity of the hydro-alcoholic extract of *Euphorbia nerifolia* in the treatment of inflammation and pain.

Antiinflammatory activity of latex of *Euphorbia* plants was investigated by Bigoniya *et al.* (2010) by carrageenan induced rat paw edema method. Topical antiinflammatory 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 antiinflammatory substances which exerts their effect due to their irritant property can be distinguished from the true antiinflammatory agents by administering them locally in the carrageenan test. This study explores safe topical use profile of *Euphorbia nerifolia* latex retaining its anti-inflammatory efficacy.

Wound Healing Study

Granulation tissue weight was 147.24 mg at 400 mg/kg extract treatment compared to 36.83 mg of control and 165.60 mg of ascorbic acid (Bigoniya *et al.*, 2007) [21]. The wound healing effect of aqueous extract of the latex was evaluated in guinea pig. The 0.5% and 1% sterile aqueous solution of extract facilitated the healing process as evidenced by increase in tensile strength, DNA content, epithelization and angiogenesis (Rasik *et al.* 1996; Pattanaik *et al.* 2014) [29, 30].

Hepato-Protective Study

Bigoniya *et al.* (2010) investigated the hepatoprotective effect of saponin fraction isolated from the leaf of *Euphorbia nerifolia* on CCl₄-induced hepatotoxicity on rat. CCl₄ (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 found that Cytosolic enzymes like SGPT, SGOT and ALP elevates in the blood and hepatic glutathione and SOD decreases. The hepatoprotectant of triterpene was compared with silymerin, a well-known standard hepatoprotectant. Euphol was isolated from *Euphorbia nerifolia* leaf total saponin fraction after separation and instrumentation. Pretreatment with total saponin fraction (50, 125 and 175 mg/kg, once a day for 4 days before CCl₄ and continued further for 3 days) attenuated and result showed that the leaf extract had potent Hepatoprotective activity.

Antioxidant Study

Bigoniya *et al.* (2009) [19] found out the effect of sub-acute administration of *Euphorbia nerifolia* leaf extract on some hematological, 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. *Euphorbia nerifolia* 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 *Euphorbia nerifolia* up to 400 mg/kg daily dose is safe and has potential to be consumed for long time in management of various diseases.

Immuno-modulatory Study

Kalpesh *et al.* 2009 determined the immunomodulatory activity of 70% v/v hydro-alcoholic extract of dried leaves of *Euphorbia nerifolia* 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 haem agglutination antibody titre method and cellular immune responses determined by footpad swelling method. The hydro-alcoholic extract of *Euphorbia nerifolia*, 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 immune suppressed rats.

In Vitro Free Radical Scavenging and Antioxidant Study

Sharma *et al.*, found that the *Euphorbia nerifolia* 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, proanthocyanidin and saponin. 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 (Pracheta *et al.*, 2011).

Diuretic Study

Bigoniya *et al.* 2005 [21] had studied that *Euphorbia 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.

Anti-Ulcer Study

Bigoniya *et al.* 2005 [21] 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 the result showed significant antiulcer activity.

Psycho-Pharmacological Study

In a study done Bigoniya *et al.*, (2005) [21] on the pharmacological activities of the leaf extract of *Euphorbia neriifolia* the investigators found that the leaf extracts had anti-anxiety, anti-psychotic and anticonvulsant activities in mice and rats.

Anti-Bacterial Study

Cachola *et al.*, (2000) studied that the ethanol extract of leave and petroleum ether extracts of the pods of *Euphorbia 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*.

In a study by Sumathi *et al.*, (2012) [25] the methanol extract of stem at 400 mg/ml showed highest activity against *pseudomonas aeruginosa* with inhibition zone of 18 mm where the control streptomycin and ampicillin at 50 µl showed 22 mm. Another result showed inhibition zone 21.32 mm against *Staphylococcus aureus* whereas streptomycin showed 4 mm. The maximum inhibition of chloroform extract at 50µg/ml was observed on *P. vulgaris* (8 mm) and *E. coli* (7 mm). Ethanol extract has shown greater activity against *K. pneumoniae* (5.0±0.41mm) and *P. Fluoresens* (5±1.1 mm) (Pokharen *et al.*, 2011; Samaresh *et al.*, 2013) [14, 24].

Anti-Fungal Study

Antifungal activity of methanol extract showed significant inhibition zone against *Aspergillus niger* (50mg/ml-no activity, 100 mg/ml-2 mm, 200mg/ml-6 mm, 400 mg/ml-12 mm) where the control group of amphotericin B showed 18mm. *Candida albicans* showed (50 mg/ml-noactivity, 100 mg/ml-04 mm, 200 mg/ml-10 mm, 400 mg/ml-14 mm) significant level of inhibition zone with the control group 21mm (Samaresh *et al.*, 2013) [14]. Chitosan with latex milk at 60µl reduced the percentage of spore germination in

Aspergillus flavus, *Aspergillus fumigates* and *Mucor* (Sumathi *et al.*, 2012) [25].

Anti-Viral Study

Among of 23 compounds were isolated from ethanolic extract of leaves, 3-β-friedelanol exhibited more potent anti-viral activity than the positive control, actinomycin D implying the importance of the friedelane skeleton as a potential scaffold for developing new anti-HCoV-229E drugs (Chang *et al.*, 2012; Zhao *et al.*, 2014) [27].

Anti-Cancerous Study

The sapogenin exerted highly significant reduction of gamma radiation-induced chromosomal aberrations (33.5% compared to 71.5% for radiation treatment alone at 4 Gy) which showed IC50 (over a period of 72 hours) of total sapogenin that inhibited growth of mouse melanoma cells by 50% was 173.78µg/ml compared to 120ng/ml for vincristine (Bigoniya and Rana, 2009) [20].

Experimental mice were pretreated with 150 and 400 mg/kg body weight of extract, 0.5% and 1% mg/kg body weight of BHA as a standard antioxidant and 50 mg/kg body weight of ENF for 21 days prior to the administration of a single dose of 50 mg/kg body weight of DENA. The study showed significant anti-carcinogenic potential of the extract and ENF against DENA-induced renal carcinogenicity might be due to the presence of flavonoids and phenolic compounds (antioxidants) (Sharma and Pracheta, 2013; Sharma *et al.* 2011) [17, 18].

Oral administration of hydro-ethanolic extract (150 and 400 mg/kg body weight), control and BHA (0.5 %) significantly decreased LPO level and significantly increased the SOD and CAT activity (Pracheta *et al.*, 2011) [18]. 3-β-friedelinol, 3-β-taraxerol, 3-α-friedelinol were isolated from extract of the aerial parts of EN showed potent cytotoxic activity on Panc-1, 81T, and BE3 cancer lines, each compound with about 60% inhibition rate at a concentration of 10 µm (Lin *et al.*, 2013) [18].

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