

An overview of *Crataeva nurvala* Buch-Ham

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ABSTRACT

India has rich source of traditional medicine. The utility of medicinal plants have been increased due to their vast chemical biodiversity from the last two decades. Among them *Crataeva nurvala* Buch-Ham commonly known as Varuna, is a well explored traditional Indian medicinal plant used to treat various ailments. The decoction is prepared from its bark and is widely used in conditions related to urine infection and related problems. It is very widely used in kidney stones and other types of calculi in urinary tract. It also promotes digestion and eases the extra burden on liver. It also relieves from pain in abdomen and is also used in gastric related disorders. It also purifies blood. Any kind of infection and worm infestation is treated by varuna. On keeping in mind the multiple bioactivities of the plant pharmacological activities as well as the chemical constituents have been summarized in the present review.

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KEYWORDS

Crataeva nurvala;
Cappridaceae;
Chemical compounds;
Pharmacological activities.

INTRODUCTION

Crataeva nurvala Buch-Ham (Family: Capparidaceae) commonly known as Varuna, is an evergreen tree indigenous to India^[1]. It is a small tree, often cultivated throughout India, especially along the streams and riverbanks. It is distributed in sub-Himalayan tracts and is indigenous to Tamil Nadu, Kerala and Karnataka. It is found in abundance, in Kerala, Madhya Pradesh, Bengal and Assam. The plant flowers mostly grow in March and fruits in June. It is an appetizer, febrifuge, diuretic and litholytic in properties. It is used in diseases like urinary disorders, urinary calculi, blood disorders, worms and tumors. The bark of the tree is an important drug for problem affecting the kidneys and bladder. In Ayurveda, the bark of the *Crataeva* has been traditionally used to heal kidney stones for more

than 3,000 years. Findings of several studies undertaken by contemporary scientists have authenticated that the herb neutralizes the enzyme called glycolate oxidase and this particular effect of the herb lessens the production of oxalates by the body. The purpose of the present study is to gather together the available published information on the different vernacular names, phytoconstituents and pharmacological activity of the plant.

Phytochemical studies showed that stem bark of the plant, fruits, leaves and root bark contain different constituents as-Stem bark of the plant contains saponins, flavonoids, sterols and glucosilicates and ceryl alcohol, friedelin, cadabicine diacetate, lupeol, betulinic acid and diosgenin^[2]. Fruits contain glucocapparin, beta-sitosterol, triacontane, triacontanol, cetyl and ceryl alcohol, pentadecane, octanamide, 12-tricosanone and friedelin^[3,4,5,6].

Review

Leaves contain L-stachydrine, dodecanoic anhydride, methyl pentacosanoate, kaemferol-0- β -D-glucoside and quercetin-3-0- β -D-glucoside^[7]. Root bark contains rutin, quercetin, lupeol, varunol and β -sitosterol. Presence of alkaloids has been reported in bark and stems^[8].

ETHNOMEDICINAL USES

The stem, roots and leaves of varuna have great medicinal value. The plant is used internally as well as externally. Externally, the paste or its leaves or skin of bark is applied in wounds. The pulp of leaves is applied on abdomen in spleen enlargement, with great benefit. The decoction of leaves given along with ghee relieves flatulence and abdominal pain. It also works well as a laxative, cholegogue, appetizer and vermicide, hence useful in anorexia, tumors, liver disorders, flatulent dyspepsia and helminthiasis. The decoction of skin of varuna alone is used as blood purifier in gout, internal abscess and adenitis and to reduce body fats in obesity. Varuna has the cardinal properties as litholytic, diuretic and urinary antiseptic. The fresh juice of its leaves is useful as a bitter tonic. Varuna is used as a cholegogue, anthelmintic and anti-amoebic in both intestinal and hepatic infestations^[9]. Thus, the bark of *C. nurvala* is contraceptive and cytotoxic and is especially useful in urinary disorders, kidney bladder stones, fever, vomiting and gastric irritation. Root and bark are laxative and lithontripic and increase appetite and biliary secretion^[10]. Although, a large number of compounds have been isolated from various parts of *C. nurvala*, a few of them have been studied for biological activity.

PHARMACOLOGICAL ACTIVITY

Some important pharmacological activities which have been reported by various workers are following.

Hepatoprotective activity

The hepatoprotective effect of aqueous-alcoholic extract of the whole plant of *C. nurvala* (400, 600 and 800 mg/kg/day) was investigated in-vivo against carbon tetra chloride induced hepato-toxicity. Re-

sults indicated that extracts boosted antioxidant enzyme level and restore serum bilirubin, cholesterol level compared to diseased state^[10].

Antidiabetic activity

Crataeva nurvala stem bark extracts have activity against in alloxan induced diabetic albino rats. A comparison was made between the action of different extracts of *C. nurvala* and a known antidiabetic drug glibenclamide (600 μ g/kg b. wt.). An oral glucose tolerance test (OGTT) was performed in diabetic rats: *C. nurvala* petroleum ether extract and ethanolic extract showed significant ($P < 0.001$) antidiabetic activities^[11].

Anticancer activity

The major compound isolated from the stem bark of *C. nurvala* is lupeol. Topical application of lupeol (40 mg/kg/3 times a week) for 28 weeks was shown to significantly decrease tumor burden, tumor multiplicity and increase tumor latency period in the mouse model^[11]. lupeol (2 mg/animal) was not only found to suppress the tumor growth, but also to impair head and neck cancer cell invasion by targeting NF κ B signaling^[12]. The chemotherapeutic potential of lupeol was also tested against the human hepatocellular carcinoma cell SMMC7721 cells. Lupeol treatment was shown to inhibit the growth and induce the apoptotic death of SMMC7721 cells. This study showed that lupeol-induced growth inhibition and apoptosis is due to down-regulation of DR3 expression in SMMC7721 cells^[13].

Antiinflammatory activity

The major compound in *C. nurvala*, lupeol on treatment (5–9.37 mg/kg) was reported to exhibit anti-inflammatory activity with a maximum inhibition of 57.14%. Lupeol is also reported to treat or reduce inflammation in a mouse model of arthritis, which is an inflammation associated disease^[14,15].

Nephroprotective activity

Alcoholic extract of *C. nurvala* (250 and 500 mg/kg for 10 days) showed protective activity against cisplatin (5 mg/kg) induced nephrotoxicity. The results suggested, alcoholic extract significantly altered the dysfunction of renal proximal tubule cells by decreasing the concentration of blood urea nitro-

gen, creatinine, lipid peroxidation, glutathione and catalase^[16].

Antipyretic activity

Ethanol extract of *C. nurvala* (200 and 400 mg/kg) showed potent anti-pyretic activity against typhoid vaccine induced pyrexia in rabbits. The result was comparable paracetamol (100 mg/kg p.o.), standard antipyretic drug^[17]

Neuroprotective activity

Sub-acute exposures (daily, for 7 successive days) of *C. nurvala* extract (100, 200 and 400 mg/kg) significantly increased antioxidant enzyme activities (SOD and CAT), total content of reduced GSH and reduced lipid peroxidation (MDA level) in rat brain homogenates in dose dependent manner, suggesting the antioxidant potential. Moreover, in Hebb's-William maze test, *C. nurvala* extract showed significant improvement in transfer latency, suggesting anti-dementia activity^[18].

Urolithic property

In Ayurveda, a detailed description of urolithiasis is mentioned under the heading of Ashmari. This work was designed to study the effect of *C. nurvala* on the experimental model of urolithiasis (albino rats). In all albino rats, stone was surgically implanted into the urinary bladder. Estimation of the urinary and serum electrolyte done periodically and x-rays were exposed at a regular interval. This study suggests the decoction of *C. nurvala* is effective in the management of urolithiasis^[19].

CONCLUSION

The detailed information regarding the biological activities of *C. nurvala* presented in this review would help the researchers to get aware of this plant and extensive research should be undertaken on *C. nurvala* for establishing new therapeutic drugs for mankind.

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