



Review Article

A Review on Medicinal Properties of *Ichnocarpus frutescens*NEHA SINGH^{*1}, TAMIZH MANI T¹, DEV PRAKASH², PRASHANT SINGH³¹Department of Pharmacognosy, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka-571422, INDIA²Department of Pharmaceutical Chemistry, Bharathi College of Pharmacy, Mandya, Karnataka-571422, INDIA³Department of Pharmaceutics, Bharathi College of Pharmacy, Bharathinagara, Mandya, Karnataka-571422, INDIA**ARTICLE DETAILS***Article history:*

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*Keywords:**Ichnocarpus frutescens*,
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Pharmacological properties**ABSTRACT**

Ichnocarpus frutescens, is a large, much-branched twining shrub, containing white latex in its all parts. Leaves 4.5-7.5 cm long, elliptic-oblong, acute or acuminate. Flowers small, greenish white, numerous, in axillary and terminal rusty-pubescent trichotomous pedunculate cymes. Fruit a follicle, 10-15 cm long, slender, cylindric. English name: Black Creeper. The roots are employed as a substitute for Sarsaparilla; it is cooling, demulcent, alterative, tonic, diaphoretic and diuretic; used in fever, dyspepsia, skin troubles, diabetes and stone in the bladder. A decoction of the stems and leaves is used in fevers. Leaves are applied to headaches, wounds and sore between fingers. Marma use root in dental caries and stems and leaves for scabies. In the present review an attempt has been made to explore a literature survey on its pharmacological properties. The whole plant as well as specific parts such as roots, leaves and flowers have been widely used and claimed against different activities.

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INTRODUCTION

Ichnocarpus frutescens L. (Fam-Apocynaceae) [1] commonly known as black creeper is a climbing shrub with slender branches; branchlets pubescent, Leaves are elliptical, obovate or oblong, entire, base attenuate, glabrous above, pubescent beneath, lateral nerves 4 to 6 pairs. Flowers are white in auxiliary and terminal peniculate cymes, 5 lobes. Found throughout India usually up to an altitude of 4000 feet's also found in hedges in deciduous forests [2]. *Ichnocarpus frutescens* is evergreen woody twiners, with branches smooth or rust, velvety when young, with milky sap. Probably, because of the rust colored stems, this creeper earned the names black creeper, Shyamalata etc. Leaves are elliptic oblong or lance-shaped, tip pointed or tapering, base rounded or narrow, 4-10 cm long, 1.5-5 cm wide. Leaves are smooth and dark green above, and paler beneath, with 2.5-5 mm long stalks. Flowers are borne in many flowered clusters, 3-8 cm across. The stalks carrying the flowers and the flower clusters are hairy. Flowers are white, about 1 cm across.

Sepals are ovate, blunt, velvety, about 1 mm long. Flower tube is about 2.5 mm long, much thickened at the mouth. Petals are 1.5 mm long, with long hairs on the margin. Follicles are solitary or paired, 10-15 x 0.5 cm, straight or curved, rusty pubescent when young. Seeds very slender, 1-2 cm long. Flowering: August-December.

A large, evergreen, laticiferous, woody creeper with rusty red appearance, found almost throughout India, ascending upto an altitude of 4000 ft. The root of the plant are used in medicine as a substitute for Indian sarsaparilla (*Hemidesmus indicus*). Roots are reported to possess demulcent, tonic, diaphoretic and diuretic properties. Root powder is administered with milk as blood purifier [3,4]. Ayurvedic formulations and local Vaidyas also used it frequently in asthma, fever, inflammatory diseases, headache and snake bite [5].

Common name: Black Creeper • Hindi: Kalidudhi, Shyamalata • Marathi: Dudhbel, Krishna-sarwa, Kante-bhoura • Tamil: paravalli, udargodi, udarkkoti • Malayalam: nannari, naruninti, palvalli • Telugu: illukkatti, karampala, muntagajjanamu • Kannada: gorwiballi, gouriballi, kappunamadaberu • Oriya: bhotinoi • Assamese: dudhkuri lota • Sanskrit: Ananta,

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bhadra, Chandanagopa• Nepali: Dudhelahara
Botanical name: *Ichnocarpus frutescens*
Family: Apocynaceae (Oleander family)

Synonyms: Apocynum frutescens, Echites frutescens, Quirivelia frutescens.

Phytochemical Studies

Studies on chemical constituents of the plant have revealed the presence of phenylpropanoids, phenolic acids, coumarines, flavonoids, sterols and pentacyclic triterpenoids [6,7]. Earlier, investigations on this plant led to the isolation of α -L-rhamnopyranosyl-(1 \rightarrow 4)- β -D-glucopyranosyl-(1 \rightarrow 3)- α -amyrin, 6, 8, 8-trimethylpentacosan-7-one, α -amyrin and its acetates, lupeol and its acetates, friedelin, epi-friedelinol and β -sitosterol from its stems [8,9]. Its leaves mainly contain flavones and glycoflavones [10], ursolic acid acetate, kaemferol, kaemferol-3-galactoside (trifolin) and mannitol [11] and its flowers contain quercetin and quercetin-3-O- β -D-glucopyranoside [12].

Five compounds were isolated and identified as n-butyl oleate (1), n-octyl tetracontane (2), tetratriacontadiene (3), n-nonadecanyl benzoate (4), and benzocosanyl arachidate (5) [13].

Pharmacological Activities

Antidiabetic

The aqueous root extract of *Ichnocarpus frutescens* (250 and 500 mg/kg, p.o.) was evaluated by Barik et al for its significant reduction ($P < 0.05$) of fasting blood glucose levels in streptozotocin-nicotinamide induced type-II diabetic rats on the 10 th and 15 th days. In the oral glucose tolerance test, the extract increased the glucose tolerance. It also brought about an increase in the body weight of diabetic rats. It was concluded that *Ichnocarpus frutescens* has significant antidiabetic activity as it lowers the fasting blood sugar level in diabetic rats and increases the glucose tolerance [14].

Another study by Bhandry et al have found that Siddis of Uttara Kannada in the state of Karnataka has used the flowers of *Ichnocarpus frutescens* and the rhizome of *Hedychium coronarium* in the treatment of diabetes [15].

Anti-inflammatory activity

Panduranga et al evaluated that methanolic extract of *Ichnocarpus frutescens* exhibited significant anti-inflammatory activity. Maximum inhibition (54.63 %) was obtained at the dose of 100 mg/kg after 3 hrs of drug treatment in carrageenan induced paw oedema, whereas

indomethacin produced 57.65 % of inhibition. In the chronic model, 300 mg/kg of MEIF like indomethacin and dexamethasone standard drug decreased formation of granuloma tissue by 22.64, 29.63 % and 34.84 % respectively. The successive methanol re-extract of *Ichnocarpus frutescens* root (MEIF) exhibited strong scavenging effects on 2, 2-diphenyl-2-picryl hydroxyl (DPPH) free radical, nitric oxide, super oxide anion, hydroxyl radical and inhibition of lipid peroxidation. These results clearly indicate strong anti-inflammatory and antioxidant properties of *Ichnocarpus frutescens* root [16].

Antipyretic activity

The methanolic extract of *Ichnocarpus frutescens* R.Br. root (MEIF) was evaluated by Panduranga et al for its anti-pyretic potential on normal body temperature and yeast-induced pyrexia in albino rats. Yeast suspension (10 ml/kg body wt.) increased rectal temperature 19 h after subcutaneous injection. The MEIF, at doses of 100, 200, and 300 mg/kg body wt., p.o., produced significant reduction in normal body temperature and yeast-provoked elevated temperature in a dose dependent manner. The effect extended up to 5 h after the drug administration. The anti-pyretic effect of MEIF was comparable to that of paracetamol (150 mg/kg body wt., p.o.), a standard anti-pyretic agent [17].

Antitumor activity

Mandal et al has evaluated the anti tumor activity of *Ichnocarpus frutescens*. Murine Ehrlich ascites carcinoma (EAC) model was used to assess PPE antitumor activity *in vivo*. PPE cytotoxicity was determined *in vitro* in U-937 monocytoid leukemia and K-562 erythroleukemia cell lines. PPE also have been assessed for the free radical scavenging activity against superoxide and nitric oxide radicals. Acute oral toxicity was performed by acute toxic classic method. The total phenolics content was quantified by the Folin-Ciocalteu method. Results of *in vivo* study showed a significant decrease in tumor volume, viable tumor cell count and a significant increase of life span in the PPE treated group compared to untreated one: the life span of PPE treated animals increased by 53.41% (50 mg PPE/kg) and 73.95% (100 mg PPE/kg). PPE (5, 10 and 20 μ g/mL) effectively inhibits *in vitro* proliferation of U-937 and K-562 cell lines. PPE exhibited pronounced radical scavenging activity with an inhibitory concentration (IC₅₀) value of 167.46 μ g/mL and 158.52 μ g/mL against superoxide

and nitric oxide radicals, respectively. PPE of *Ichnocarpus frutescens* possesses strong free radical scavenging activity and anti-tumor activity in vitro and in vivo [18].

Hepatoprotective activity

Deepak et al have been evaluated hepatoprotective and antioxidant activity of *Ichnocarpus frutescens* (Linn.) R.Br. on paracetamol-induced hepatotoxicity in rats. The entire plant including the flowers, of *Ichnocarpus frutescens* R.Br. (Apocynaceae) has been used for the treatment of cancer, skin infections, diabetes and liver disorder. The present study is aimed at evaluating the hepatoprotective effect of chloroform and methanol extract (CEIF and MEIF) of whole plant of *Ichnocarpus frutescens* (Linn.) by paracetamol-induced liver damage in rats. From this study, it can be concluded that the chloroform and methanol extract of *Ichnocarpus frutescens* is not only an effective hepatoprotective agent, but also possesses significant ($p < 0.05$) antioxidant activity [19].

In other study Kumarappan et al have evaluated protective and curative effects of polyphenolic from *Ichnocarpus frutescens* leaves on experimental hepatotoxicity by carbon tetra chloride and tamoxifen [20].

Antioxidant activity

Faheem et al have studied the antioxidant activity of *Ichnocarpus frutescens*. Various extracts and fractions were prepared by using solvents of different polarity, flavonoids were isolated and antioxidant activity was studied by using DPPH assay and by measuring the scavenging capacity of the hydroxyl radicals (degradation of 2-deoxyribose with hydroxyl radicals). In the studied models, amongst the various extracts, fractions and isolated flavonoids the isolated pure flavonoid separated from ethyl acetate fraction of alcoholic extract showed the remarkable and concentration dependent antioxidant activity than the other extracts and fractions. The IC₅₀ values were calculated. The results were comparable with standard ascorbic acid. Hence we conclude that isolated pure flavonoid-I (F-I) separated from ethyl acetate fraction of alcoholic extract of flowers of *Ichnocarpus frutescens* L is more bioactive than other fractions and extract studied [21].

Analgesic activity

Nitin et al have scientifically proved for analgesic and anti-inflammatory activity of *Ichnocarpus frutescens* and the present study was under taken to evaluate the topical preparation of methanolic extracts of root of *Ichnocarpus frutescens* for analgesic and anti-inflammatory activities. Four different concentrations of the root extract was made in to a topical preparation i.e IF 1%, IF 2%, IF 4% and IF 6% with the help of a cream base containing cetyl alcohol, white petrolatum, mineral oil, carbapol, tween 80, water and Propylene glycol. All the four formulations along with cream base were screened for their analgesic and anti-inflammatory activities using formaline induced paw licking test and carrageenan induce paw edema models respectively. In analgesic activity, the IF 6 % has showed significant analgesic effect by decreasing the no. of paw lickings in formalin induced rat paw licking test; In antiinflammatory activity the IF 1%, IF 2% has showed slight inhibition and IF 4%, IF 6% have showed significant inhibition of carrageenan induced rat paw edema compared to control group in which only cream base was used [22].

CONCLUSION

The plant has a large number of traditional medicinal uses, including treatment for rheumatism, asthma, cholera, and fever. Laboratory studies have demonstrated that extracts of the plant inhibit tumors, protect liver cells from damage in acetaminophen overdose, and correct hyperlipidemia in diabetic rats. It also has analgesic and antiinflammatory properties, reduces fever, and lowers fasting glucose and improves glucose tolerance in diabetes.

The root of *Ichnocarpus frutescens* is used as an alternative tonic, diuretic and demulcent. The root powder is administered with milk for diabetes, stone in and fever. There is no doubt that this plant is a reservoir of potentially useful chemical compounds which serve as drugs, are provided newer leads and clues for modern drug design by synthesis. Due to its many medicinal properties, there is enormous scope for future research on *Ichnocarpus frutescens* and further clinical and pharmacological investigation should be conducted to investigate unexploited potential of this plant.

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