

PHYTOCHEMISTRY AND PHARMACOLOGICAL ACTIVITIES OF *CAPPARIS ZEYLANICA*: AN OVERVIEW

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ABSTRACT

Capparis zeylanica Linn. (Capparidaceae) has been used as a 'Rasayana' drug in the traditional Ayurvedic system of medicines. *Capparis zeylanica* Linn. is reported to possess antioxidant, antipyretic, analgesic, anti-inflammatory, antimicrobial and immunostimulant activity. Phytochemical screening of the plant has shown the presence of fatty acids, flavonoids, tannins, alkaloids, E-octadec-7-en-5-ynoic acid, saponins glycosides, terpenoids, saponin, p-hydroxybenzoic, syringic, vanillic, ferulic and p-coumaric acid. This review explains the evidence based information regarding the phytoconstituents and pharmacological activities of *Capparis zeylanica* plant which helps the researcher to investigate more about this important rasayana.

KEYWORDS: Rasayana, Immuno stimulant, Terpenoids, Vanillic acid.

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INTRODUCTION

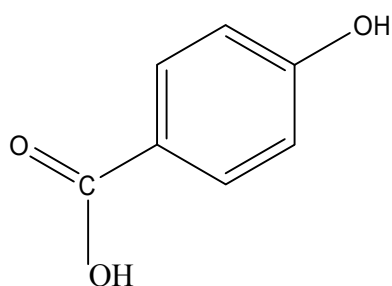
Capparis zeylanica Linn. is commonly known as Indian caper; a climbing Scandant shrub and found throughout India^{1,2}. *Capparis zeylanica* Linn is belonging to the family Capparidaceae³. Plants are 2-3 m in height, armed with 3-6mm long recurved thorns, branched, leaves are elliptic or broadly lanceolate, base rounded, apex mucronate; flower profuse, pinkish white, later turning pink, berries are globular or elliposide, 3-4 cm in diameter, and seeds are globase, embedded in white pulp. It is grows in moist habitat. The plant is distributed throughout the major parts of India, Bangladesh and some parts of Pakistan⁴. Common name of the plant are Wagati, Govindphal², Asadhua in Oriya, Ardanda in Hindi⁵ and Kathotti in tamil⁶.

Traditional Uses

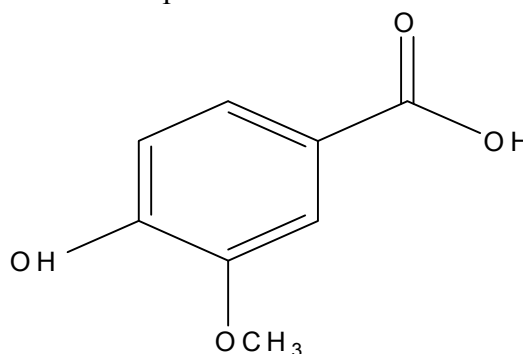
Traditionally *Capparis zeylanica* L. was first time reported used as vegetable². Root bark is ground with water, boiled and taken orally to treat indigestion⁶. Traditionally it is use as Antidote to snake bite, to cure swelling of testicle, small pox, boils, cholera, colic, hemiplagia, neuralgia, sores, pneumonic & pleurisy⁷⁻¹⁰. In Northern India, the leaves are widely used as counter-irritant, febrifuge and as a cataplasm in swellings, boils and piles¹. Leaf and stem parts are as spasmolyte¹¹. Root bark preparation is used as a sedative¹². Leaves extract of *Capparis zeylanica* L with black pepper powder is taken towice daily for the treatment of dysentery¹³. Leaves juice of *Capparis zeylanica* L taken orally with cup of fresh gout milk for curing cough and cold¹⁴. For the treatment of diabetes ripe fruits are consumed twice for fortnight and during ingestion, stem bark extract is administered thrice daily¹⁵. *Capparis zeylanica* L. plant is also served as an appetizer prepared as a dipping paste with pepper, tamarind and garlic¹⁶. Grind the stem bark by adding 10 seeds of black pepper, 2 bulbs of garlic and mix it into 500ml water. Given twice daily for two days to cure colic. Handful fresh roots, 50g onions, 50g jaggery grind all together and make a bolus. Feed *Capparis zeylanica* L. twice daily for 3 days to cure convulsive seizures¹⁷.

Chemical Constituents

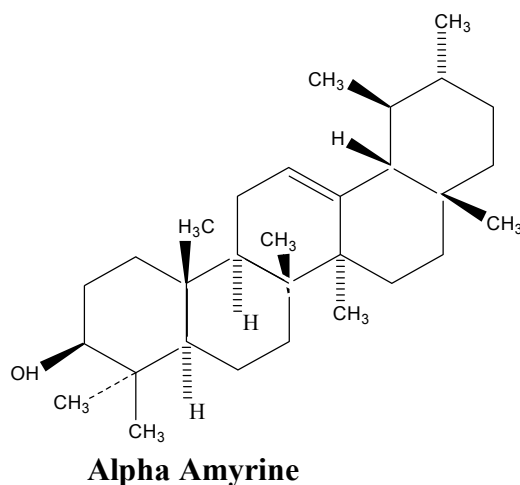
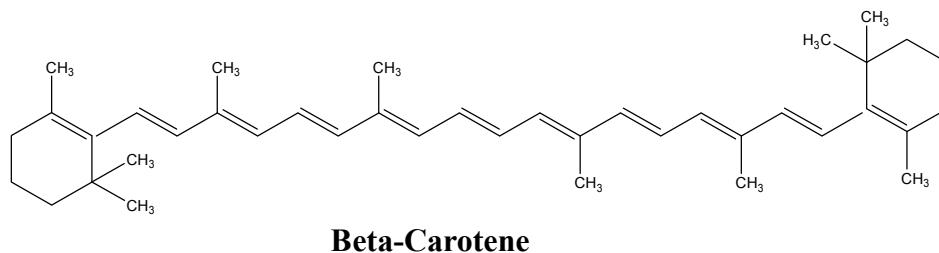
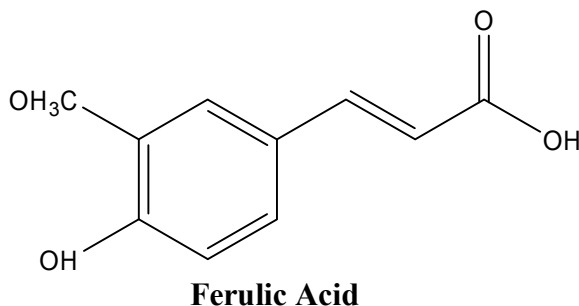
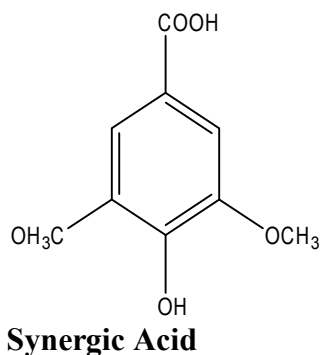
A new fatty acid, E-octadec-7-en-5-ynoic acid, has been isolated from chloroform extract of the roots of *Capparis zeylanica*. The structure of this compound was established primarily by 1D and 2D-NMR spectroscopy¹⁸. Preliminary phytochemical screening of the extracts showed the presence of alkaloids, flavonoids, saponins glycosides, terpenoids, tannins, proteins and carbohydrates¹⁹. Whole plant showed the presence of saponin, p-hydroxybenzoic, syringic, vanillic, ferulic and p-coumanic acid. Leaves & seeds showed presence of β -carotene, thioglycoside, glycocapparin, n-tricortane, α -amyrin & fixed oil where as root bark showed presence of an alkaloid, a phytosterol, a water soluble acid and a mucilaginous substance^{20,21}. The elemental analysis was performed by EDX to estimate 11 elements namely C, O, Mg, Al, Si, Cl, K, Ca, Fe, Cu, Zn. The result showed that these plant content less weight percentage of Aluminum (Al) as compare to other essential elements. The finding showed the entire plant of *C. zeylanica* possesses all eleven essential elements except chloride⁴.



P-Hydroxy Benzoic Acid



Vanillic Acid



Pharmacological Activities

Antioxidant activity

For antioxidant activity evaluation, ethanol and methanol extracts were of the *Capparis zeylanica* L. root were prepared and screened for *in-vitro* antioxidant activities by 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging activity and by reducing power assay method. The results of both the methods were compared with a natural antioxidant ascorbic acid (vitamin C) as a standard. Both the extracts showed strong antioxidant activity in these methods. Amongst these two extracts, ethanolic extract has shown better antioxidant activity as compared to methanolic extract²².

Immunomodulatory effect

Study was undertaken to explore the immunomodulatory activity of ethanolic and water extracts of *Capparis zeylanica* Linn. leaves on neutrophil adhesion test, humoral response to sheep red blood cells, delayed-type hypersensitivity, phagocytic activity and cyclophosphamide-induced myelosuppression. Oral administration of ethanolic and water extracts of *Capparis zeylanica* leaves, at doses of 150 and 300 mg/kg in mice, dose dependently potentiated the delayed-type hypersensitivity reaction induced by

sheep red blood cells. Immunomodulatory activity was also assessed by serological and haematological tests. *Capparis zeylanica* extracts prevented myelosuppression in mice treated with cyclophosphamide drug. The study comprised the acute toxicity and preliminary phytochemical screening of the ethanol and water extracts²³. The combined treatment of cyclophosphamide, ethanol and water extract of *C. zeylanica* restoration of bone marrow activity was reported²⁴.

Analgesic, anti-inflammatory and antipyretic effect

The ethanol and water extracts of *Capparis zeylanica* leaves showed dose-dependent and significant increases in pain threshold in tail-immersion test. Moreover, both the extracts (100–200 mg/kg) exhibited a dose-dependent inhibition of writhing and also showed a significant inhibition of both phases of the formalin pain test. The water extract (200 mg/kg) significantly reversed yeast-induced fever¹⁹. Anti-inflammatory and analgesic activity of *Capparis zeylanica* L. root extract is also documented²⁵. Methanolic extract of *Capparis zeylanica* plant possesses a significant antipyretic effect in yeast induced elevation of body temperature in experimental rats. It was revealed that the extract showed dose dependent antipyretic activity. At a dose of 200mg/kg it showed significant antipyretic activity. Presence of flavonoids in the methanolic extract of *Capparis zeylanica* plant may be contributory to its antipyretic activity²⁰.

Antimicrobial and Cytotoxic activity

Antimicrobial assay showed that chloroform, ethanol and water extracts of *Capparis zeylanica* root exhibited *in-vitro* antibacterial activity against Gram positive and Gram negative bacteria, where as petroleum ether exhibited antibacterial activity against selected bacterial strains (*S. aureus*, *B. subtilis*, *K. pneumonia* and *P. vulgaris*)²⁶. The cytotoxic activities of crude extract and fatty acid are also explored²⁷.

Other pharmacological activities

C. zeylanica constitutes flavonoids have been known to possess, anti-neoplastic, anti-ulcer activities. Anti-allergic, gout, astringent, diabetic (kidney disinfection) are found in fruits and roots of the *C. zeylanica* was reported^{3,28}.

CONCLUSION

Major push by whole of the pharmaceutical industry is focused towards design and development of new novel and indigenous plant based drugs through investigation of leads from traditional system of medicine²⁹. In recent years, ethno-botanical and traditional uses of natural compounds, especially of plant origin received much attention as they are well tested for their efficacy and generally believed to be safe for human use. Review of *Capparis zeylanica* L. depicted the fact that it is a popular remedy among the various Traditional systems and Ayurvedic practitioners for cure number of ailments. It is a need to explore this plant thoroughly for more therapeutic potential.

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