

Ceropegia juncea Roxb.: A Review

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Abstract

Nature has abundant source of herbs. Each herb have certain phyto-constituents, that isolated substances are utilized as drug. Through this review distribution, morphology, phytochemistry and pharmacological *Ceropegia juncea* Roxb. were analysed. The steroids, terpenoids, anthocyanins, anthracene glycosides, coumarins, flavonoids, fatty acids, phenolic compounds, alkaloids, carotenoids, tannins, saponins, and carbohydrates, lipids, sugars, potassium, lupeol and stigmasterol are found in preliminary phytochemical analysis. FTIR results have shown the functional groups of alcohol, aldehyde, alkyne, alkene and amines, except ester. The proven results of HPLC & HPTLC showed the presence of cerapegin. Cerapegin is reported to hypotensive, hepatoprotective, antiulcer, antipyretic. Also, the coumarin present in *Ceropegia juncea* Roxb is found to have anti – coagulant, anti- oxidant, anti – allergic, anti- thrombotic, anti – inflammatory, anti – proliferative, anti-viral, anti- carcinogenic, analgesic activities, cytoprotective and modulatory functions. Coumarin and ceropegin are mostly used to prepare soma drink and also there were 29 components isolated from *C.juncea* Roxb. The antimicrobial studies also notified in this review. This review summarizes the medicinal value of *Ceropegia juncea* Roxb. in both traditional and ayurvedic system.

Keywords

Phytochemistry, pharmacology, anti- microbial, soma drink, ceropegin

Introduction

Herbs are playing vital role and traditional medicine has major role in the recent world. Due to industrialization and civilization, all living creatures were affected and changed our life style. The *Ceropegia juncea* Roxb. is growing in tropical areas like South – East Asia, Canary Islands, New Guinea, Tropical Arabia, Africa, Mediterranean region and Northern Australia. *Ceropegia juncea* Roxb. is endemic to Western ghats in India. Which is covered by 55 species, from these species ceropegia is higher (Muthukrishnan *et al.*, 2013). In this tribe ceropegiae, they contain 200 species in the margin of Indian ocean (Subbiyan *et al.*, 2015). *Ceropegia juncea* Roxb. was IUCN categorized as threatened species (Uma & Parthipan, 2015) and it is similar to *Sarcostemma acidum* Wight & Arn., their benefits and characteristics are same (Sandeep Pandey *et al.*, 2017). *Cynanchum viminalis* L. also similar in the presence of phytoconstituents(Deepak *et al.*, 2021).

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Majority of the *Ceropegia* species are producing “tuberous root or fascicled roots”. The twinning perennial herb with lanceolate shaped leaves are present in young stem, which is scaly, opposite, acute, absent in mature stem. *Ceropegia juncea* Roxb. is belong to Asclepiadoideae, sub-family within the family Apocynaceae (Boomibalagan *et al.*, 2015 & Sudha Karayil & Veeraiah, 2014). Flowers are yellow, green and purple colour and axillary, corolla tube curved, purple dotted, pollen aggregated in the form of pollinia, goglet shaped borne in umbels, (Chintha Pradeepika, 2018) fruit elongated follicle, seeds flat with tuft of whitish hairs (Sudha Karayil & Veeraiah, 2014). Which have well developed fly- trapping mechanisms and that is known as autogamy (Karuppusamy & Pullaiah, 2009). Pollination is limitation factor for fruit set under certain conditions. The maturation of flower and fruit is occur every year in the month of July – November (Sri Rama Murthy *et al.*, 2012). The propagation method of *Ceropegia* members mostly through root tubers and stem cuttings (Rohit Umesh Shete, 2014).

Since vedic period *Ceropegia juncea* Roxb. was considered as well known medicinal plant and it is growing in drier parts of Peninsular India. The plant was protected under certain ex-situ condition (Karuppusamy & Pullaiah, 2009). The “Flora of Madras Presidency” (Gamble, 1935) and Flora of Tamil Nadu Carnatic (Mathew, 1991) was used to identify the specimen.

The plant was known by different name as follows:

- ✓ Tamil : Pulicha kodi, Velipulichan
- ✓ Sanskrit : Somalata, Somaraji, Soma valli
- ✓ Hindi : Somalata
- ✓ Telugu : Pullakada, Bella-gada
- ✓ Malayalam : Somalata, Bhutumbi (Sudha Karayil & Veeraiah, 2014).

Traditional uses of *Ceropegia juncea* Roxb.

Ceropegia juncea Roxb. extractions were contain high amount of natural anti – oxidants, applied in traditional medicine production. The special feature of this plant used to prepare soma drink and cure many disorders, (Visveshwari *et al.*, 2017). To heal abdomen and gastro – intestinal problems through an exclusive alkaloid for certain health issues like local anesthetic, anti- pyretic, mast – cell stabilizing, transquilising and hypotensive activities (Binish *et al.*, 2018 & Bhardwaj and Maya Sharma, 2019). *C. juncea* Roxb. cures stomach ulcer, galactagogue (Santhosh kumar *et al.*, 2019 & Jain, 1991) and their fresh fleshy shoot cure intestinal problems (Uma & Parthipan, 2015). The combination of goat milk with crushed stems like *Ceropegia juncea* Roxb. was taken orally for three days to cure disease like ulcer by Paliyan or Paliyar tribe in Sirumalai hills of Southern India. Leaves of this plant decoction and juice used to cure bacterial infection, ulcer and inflammation (Mownika *et al.*, 2021).

Threatened Species

The various species of *Ceropegia* is under threatening condition, because of more consumption. *Ceropegia juncea* Roxb. due to its high medicinal value leads to over exploitation of living areas (Sri Rama Murthy *et al.*, 2012). Loss of living areas, climatic condition, less awareness of protecting plants, low seed formation, poor seed germination, animal disturbance, mode of preparation and consumption. RET condition of all *Ceropegia* species are over exploitation from natural habitat (Subbiyan *et al.*, 2015).

Phytochemistry of *Ceropegia juncea* Roxb.

Ceropegia juncea Roxb. contain the various phytochemicals such as alkaloids, carotenoids, steroids, terpenoids, anthocyanins, anthracene glycosides, coumarins, flavonoids, fatty acids, phenolic compounds, saponins and carbohydrates (Sharma Paras *et al.*, 2011, Visveshwari *et al.*, 2017 & Sudha Karayil *et al.*, 2014), sugars, potassium (Muthukrishnan *et al.*, 2013) and lupeol, stigmaterol were identified through HPTLC method (Deepak *et al.*, 2021). The GC-MS proves that methanol extract of *C. juncea* contains p-(Dimethylamino) benzaldehydeoxime and 29 components were identified. FTIR results shown the functional groups of alcohol, aldehyde, alkyne, alkene and amines, except ester are present and peak wavenumber 3354.08cm⁻¹ exhibited O-H Alcohol functional group (Visveshwari *et al.*, 2017). Polyuronoids and chlorogenic acids were not identified in the test plant in TLC analysis (Sudha Karayil & Veeraiah, 2014).

Cerapegin

The cerapegin characteristic to *C. juncea* Roxb. plant material, found to be fraction method (Nikam and Savant, 2009) and also separated triterpene, lupeol. The cerapegin which cures tranquilizing, hypotensive, hepatoprotective, antiulcer, antipyretic, topically anaesthetic activities in experimental animals (Khare, 2007). Cerapegin there is no changes in autonomic or behavior until the dose of 200mg/Kg but the convulsions in mice (Chintha Pradeepika, 2018). The Cerapegin - pyridine alkaloid, which is used to prepare soma drink. Kaizo Matsuo & Takahiko Arase, 1995).

Coumarin

The phytochemical analysis like HPLC and TLC results proved 4-Methyl Coumarin bioactive compound is present in the *C. juncea* Roxb. This compound is peculiar in pharmaceutical industry, which cures different diseases and disorders such as anti-coagulant, hepatoprotective, anti-oxidant, anti-allergic, anti-thrombotic, anti-inflammatory, anti-proliferative, anti-viral, anti-carcinogenic, analgesic activities, cytoprotective and modulatory functions. (Sudha Karayil *et al.*, 2014).

Antimicrobial Activity

Ceropegia juncea Roxb. tested with different microbes and the significant inhibitory effect was found against *Pseudomonas aeruginosa*, *Escherichia coli* and *Klebsiella pneumoniae* while using methanolic extract of *Klebsiella pneumoniae* and *Proteus vulgaris* in aqueous extract. The *Candida albicans* was not shown positive results in all solvent extracts of *C. juncea* Roxb. (Boomibalagan *et al.*, 2015). All the selected bacteria inhibit the growth of *C. juncea*

crude methanol extract and inhibitions zone may vary according to the bacterial species. Which cures urinary tract infection, urinary disorders and it control the disease causing bacteria like *Escherichia coli* and *Staphylococcus aureus* (Visveshwari *et al.*, 2017). Ceropegin compound does not shown any antibacterial activity against a few Gram ^{+ve} and Gram ^{-ve} organisms were examined (Chintha Pradeepika, 2018).

Pharmacology Values

Toxicity study reveals that animals were safe until maximum dose of 3000 mg/kg body weight. They do not cause any change in physical appearance and without causing poisonous substances, mortality were noticed. The biological determination was analysed in the following ratio 100, 200, 300, 400 mg/kg body weight (Sharma Paras *et al.*, 2011). The toxicity of *C. juncea* reduces sub – acute toxicity and their side effects (Chintha Pradeepika, 2018).

The ulcer was calculated by using magnifying glass and the circumference of the ulcer was evaluated with vernier caliper.(score 1: Maximal diameter of 1 mm, score 2: Maximal diameter of 1to 2 mm, score 3: Maximal diameter of 2 to 3 mm, score 4: Maximal diameter of 3 to 4 mm, score 5: Maximal diameter of 4 to 5 mm, score 10: An ulcer over 5mm in diameter, score 25: A perforated ulcer). The ulcer was compared with control group and the ulcer index 89.36 ± 9.87 , highest ulcer noticed in score 3 & 4. The perforated ulcer was resulted in score 25 and there is no perforated ulcer in score 1 & 2. The examined ulcer activity decrease the amount and overall acidness, rise the P^H of gastric fluid. In normal rat contrast to pylorus – ligation was rise lipid peroxidation and reduce SOD, catalase and decreased glutathione in control, which leads to oxidative stress(Sharma Paras *et al.*, 2011).

The *C. juncea* extract against anti – cancer activity which effect through ethyl acetate fraction which proves cell lines like HCT – 118 (Colon cancer cell) (Chintha Pradeepika, 2018).

Ceropegia juncea Roxb. methnolic, ethanolic extracts of both in- vitro and in - vivo plants are analysed with α - amylase and α - Glucosidase enzymes are present in the colon of man. Which helps to breakdown the carbohydrate to starch and oligosaccharides. The suppression process of carbohydrate,which reduce in the sucking and lowering glucose level (Saraswathy *et al.*, 2017).

Ceropegia juncea Roxb. methnolic, ethanolic extracts of both in- vitro and in - vivo plants are analysed through albumin denaturation assay and membrane stabilization assay reduces the inflammation. Both in- vitro and in – vivo plant have equal quality and quantity of phytoconstituents (Saraswathy *et al.*, 2017).

The *Ceropegia juncea* Roxb. which contains heavy metals like “chromium (0.036 $\mu\text{g/g}$), manganese (0.017 $\mu\text{g/g}$), copper (1.637 $\mu\text{g/g}$), zinc (0.247 $\mu\text{g/g}$), cadmium (0.053 $\mu\text{g/g}$), mercury (0.0) and lead (0.002 $\mu\text{g/g}$), arsenic (0.60 $\mu\text{g/g}$)”. The metals which are present in the *Ceropegia juncea* Roxb is highly therapeutic, used for several diseases under the suggestion of “World Health Organization” and it is acceptable by human health (Sudha Karayil *et al.*, 2014).

Free radical have redox properties, carboxylic group, conjugated ring structure these are inhibit lipid peroxidation. Essential defense enzyme SOD helps catalyses the dismutation of superoxide radicals. Administration of CJEE causes significant increase in SOD, Catalase reduced glutathion levels with all doses in comparison to control animals, which suggest its efficacy in preventing free radical induced damage. CJEE has also increased the activities of Na⁺K⁺ Atpase, Ca²⁺ Atpase and Mg²⁺ Atpase (membrane bound enzymes) in both the models” (Sharma Paras *et al.*, 2011).

Conclusion

The *Ceropegia juncea* Roxb. have high medicinal value and antimicrobial studies reveals that few positive microbial growth. Cerapegin and coumarin as bioactive compound to cure many diseases identified by both in – vitro and in- vivo plant extracts exhibit same result. The endemic plant species of *Ceropegia juncea* Roxb. is create awareness among people to grow in large quantity for their high medicinal value.

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