



Updated Review on Pharmacognosy, Phytochemistry & Pharmacological Studies of *Coccinia Indica*

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ABSTRACT

The present review highlights the Pharmacognosy, phytochemistry and pharmacological study of *Coccinia indica*. There are many patented formulations derived from *Coccinia indica* are now distributed increasingly all over the world. This has given rise to a concomitant increase in research on the phytochemical constituents and biological activity of *Coccinia indica*. It belongs to Cucurbitaceae family and it's widely used for hypoglycemic and antidiabetic activities in ayurvedic system of medicine. Mainly in its fruit had rich value of antidiabetic properties comparatively other parts of plant of *Coccinia Indica*, but the whole plant of *Coccinia indica* having pharmacological activities like analgesic, antipyretic, anti-inflammatory, antimicrobial, antiulcer, antidiabetic, antioxidant, hypoglycemic, hepatoprotective, antimalarial, antidiabetic, anticancer, antitussive, mutagenic. The purpose of review on particular plant is many traditional medicines in use are obtained from medicinal plants, minerals and organic matter. During the past several years, there has been increasing interest among the uses of various medicinal plants from the traditional system of medicine for the treatment of different ailments. *Coccinia indica* has been used in traditional medicine as a household remedy for various diseases.

Keywords: *Coccinia Indica*; Phytochemistry; Pharmacology; hypoglycemic; antiulcer; antidiabetic; antioxidant; household remedy.

INTRODUCTION

A vast majority (Pekamwar S. et al, 2013) of the population, particularly those living in rural areas depends largely on medicinal plants for treatment of diseases. There are about 7000 plant species found in India. The WHO estimates that about approximately 80 – 85 % of the population living in the developing countries relies almost on traditional medicine for their primary health care needs. Plants have played a significant role in maintaining human health and improving the quality of human life.

Coccinia indica (U.A. Deokate, et al, 2012) (syn. *Coccinia grandis*, *Coccinia cordifolia*, *Cephalandra indica*) belonging to family Cucurbitaceae, Generally known as ivy gourd/little gourd in English or kundru/kanduri in Hindi, and kovaangai in Tamil. It is indigenous to Tamilnadu and other parts of India. *Coccinia indica* grows plentifully all over India and throughout the oriental countries. The plant has also been used broadly in

Ayurveda and Unani practice in the Indian subcontinent.

These present reviews impart requisite information on *Coccinia indica* with respect to its morphological characters, chemical constituents and pharmacological activities.

Botany of Plant Cucurbitaceous (Sujata Nagare, et al, 2015)



Figure 1: *Coccinia indica* fruits

The cucurbits are characterized by having 5-angled stem and coiled tendrils. The leaves are alternate and usually palmately 5-lobed or divided without stipules. The flower is actinomorphic and dioecious. The calyx bears 3-6 lobes and a 3-6 lobed sympetalous corolla is

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Received on: 15-01-2017
Revised on: 03-03-2017
Accepted on: 17-03-2017

Table 1: Different Variety of Coccinia (Sujata Nagare, et al, 2015)

Name of Variety	Synonym
Coccinia abyssinica (Lam.) Cogn	Bryonia abyssinica Lam
Coccinia adoensis (A. Rich.) Cogn.	Coccinia parvifolia Cogn., Coccinia pubescens (Sond.) Eyles, Momordica adoensis A. Rich.
Coccinia grandis (L.) J. Voigt	Coccinia cordifolia Wight, Coccinia indica, Coccinia cordifolia, Cephalandra indica, Bryonia cordifolia, Coccinia grandis (L.) Voigt
Coccinia palmata (Sond.) Cogn.	Cephalandra palmata E. Mey. ex Sond.

Table 2: Taxonomical classification (Sujata Nagare, et al, 2015)

Kingdom	Plantae
Super Division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Order	Cucurbitales
Family	Cucurbitaceae
Genus	Coccinia
Species	Coccinia grandis

Table 3: List of Plant parts & Respective Phytochemical Constituents (Sujata Nagare, et al, 2015)

S. NO.	Part(s) of Plants	Chemical constituent
1	Root	Flavonoid glycoside ombuin 3-oarabinofuranoside Triterpenoid, saponin coccinoside - k (i). C ₄₁ H ₆₆ O ₁₂ ; Stigmast-7-en-3-one Lupeol, β- amyirin and β- sitosterol.
2	Aerial Parts	Heptacosane Cephalandrol, C ₂₉ H ₅₈ O tritriacontane C ₃₃ H ₆₈ β- sitosterol alkaloids Cephalandrine a and Cephalandrine b.
3	Leaves & Stem	β- Sitosterol, Cephalandrol, Cephalandrine A & B, Heptacosane.
4	Fruits	Taraxerone, taraxerol, and (24R)-24- ethylcholest- 5- en- 3β- ol glucoside. β- Carotene, lycopene, cryptoxanthin, and apo- 6'- lycopenal. β- sitosterol and taraxerol
5	Whole Plant	Aspartic acid, Glutamic Acid, Asparagine, Tyrosine, Histidine, Phenylalanine and Threonine Valine Arginine.

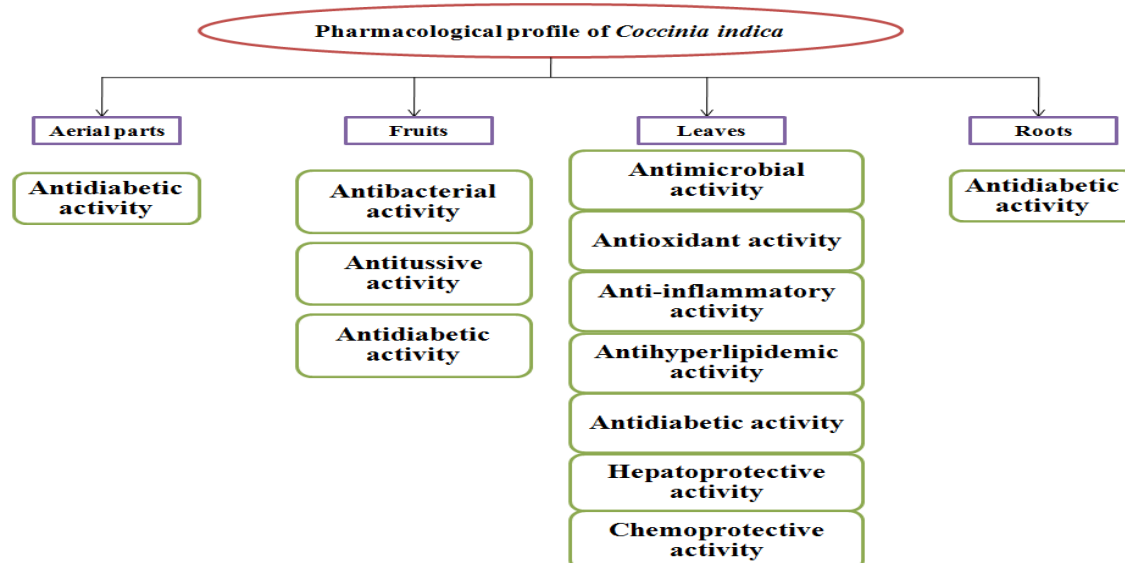


Figure 2: Pharmacological profile of various parts of Coccinia indica. (Lalit Kishore, et al, 2013)

Table 4: Pharmacological review of plant *Coccinia indica*

S.No.	Activity	Model	Plant Part
1	Antidiabetic activity (Ramakrishnan.M, et al 2011)	Alloxan diabetic albino rats	95% ethanolic extracts of root
2	Antidiabetic activity (Ramakrishnan.M, et al 2011)	Streptozotocin induced diabetic rats	n-hexane extract of leaves & Stem
3	Antidiabetic activity (Arumugam.G et al 2013)	Normal and streptozotocin (STZ) diabetic rats.	Leaves
4	Antidiabetic activity (Arumugam.G et al 2013)	Alloxan diabetes in rabbits	Roots
5	Antidiabetic activity (Arumugam.G et al 2013)	Normal and Streptozotocin-induced male diabetic rats	Leaves
6	Hypoglycemic activity (Yogesh Shivhare et al 2013)	Normal rats	Pectin isolated from the fruit
7	MOA of hypoglycemic activity (Yogesh Shivhare et al 2013)	Glucose tolerance test	Alcoholic extract of <i>Coccinia indica</i> (100mg/kg.),
8	Hypoglycemic activity (Yogesh Shivhare et al 2013)	Rabbits	Alcoholic and aqueous extract of root powder
9	Antidiabetic activity (Priyanka Tailwal et al 2016)	Dog	Dried extract of Whole plant
10	Antioxidant activity (Zafir zahid,et al 2015)	Streptozotocin- diabetic rats	Ethanolic extract of leaves
11	Anti-inflammatory activity (Sk. Amir Hossain et al 2014)	Carrageenin and histamine induced paw edema	fruit juice powder
12	Antinociceptive activity (Sk. Amir Hossain et al 2014)	Writhing induced by acetic acid in mice	fruit juice powder
13	Analgesic activity (Sk. Amir Hossain et al 2014)	Tail flick model in rats	Aqueous extract of fresh leaves
14	Antipyretic activity (Yogesh Shivhare et al 2013)	Yeast- induced hyperpyrexia in rats	Aqueous extract of fresh leaves
15	Larvicidal activity (Yogesh Shivhare et al 2013)	Early fourth instar larvae of <i>Aedes aegypti</i> L. and <i>Culex quinquefasciatus</i> (say) (Diptera: Culicidae).	hexane, ethyl acetate, petroleum ether, acetone and methanol extracts of the leaf <i>Citrullus colocynthis</i> , <i>Coccinia indica</i> , <i>Cucumis sativus</i> , <i>Momordica charantia</i> , and <i>Trichosanthes anguina</i> ,
16	Hepatoprotective activity (Zafir zahid,et al 2015)	CCL4 induced hepatotoxicity in rats	Ethanolic extract of fruits
17	Antituberculosis activity (Zafir zahid,et al 2015)	Experimental tuberculosis in Guinea pigs	Extract of fruit
18	Antidiabetic Activity (Alagarraja.M et al 2015)	In vivo method for estimation of Sugar level by using UV instrumentation	Extract of Fruit

Table 5: Essential Nutrients

Nutrient	g/mg
Water	93.5 g
Protein	1.2 g,
Energy	75 kJ (18kcal)
Fiber	1.6 g
Carbohydrate	3.1 g
Fat	0.1 g
Fe	1.4 mg
Thiamin	0.07 mg
Ascorbic acid	1.4 mg
Riboflavin	0.08 mg
Ca	40 mg,
Niacin	0.7 mg

found. The androecium is highly variable, consisting of basically 5 distinct to completely connate stamens that are twisted, folded or reduced in number. The gynoecium consists of a single compound pistil of 2-5 carpels. Generally with one style and many style branches. The ovary is inferior with one locule and usually numerous ovules. The fruit is a type of berry called pepo.

**Figure 3: Coccinia indica Leaves**

Detailed Review about Pharmacological Studies of Coccinia Indica (Nikhila.M.Nair, et al, 2015)

Anti-stress and free radical scavenging activity

The 50% methanolic extract of whole plant of coccinia indica showed strong free radical scavenging activity almost same as that of Ginseng. The LD50 of 50% ethanolic extract of coccinia indica was 3163.28 mg/kg of body weight on oral administration⁴. The present study provides scientific support for the anti-stress and free radical scavenging activity of coccinia indica extracts.

Anti-hyperglycemic and hypolipidemic effect

Coccinia Indica was identified to be rich in β -carotene, a major precursor of vitamin A from plant sources. β -Carotene is a good source of protein, fiber and moderate source of calcium. This plant has the higher efficiency of lowering serum triglycerides.

Anti-ulcer and anti-oxidant effect

The effect of leaves powder extracted with water and

methanol was tested on aspirin induced gastric model in wistar rats. The leaf powder of plants showed extensive dose related decrease in ulcer with significant increase in mucous discharge and decrease in level of lipid peroxidation and superoxide dismutase activity.⁸ Methanol extract at a comparable dose to that of the powder also showed a significant decline in ulcer with important changes in mucous secretion, lipid peroxidation and superoxide dismutase.

Anti-microbial activity

Anti-microbial activity of eight different solvent extracts (petroleum ether, diethyl ether, chloroform, ethyl acetate, acetone, methanol, ethanol, aqueous extracts) of fruit of plant was tested against six gram negative and gram positive bacteria. Petroleum ether extract was the most active and showed considerable anti-bacterial activity against all tested gram positive and gram negative bacteria producing a maximum inhibition zone of 90mm against staphylococcus aureus. Other tested extracts also inhibited the growth of a number of test organisms but to a lesser extent and were active against the gram-positive s. aureus¹¹. The study also revealed that methanol extract was found to be active against Bacillus cereus and pseudomonas putida producing inhibition zones of 15 and 13 mm respectively.

Larvicidal activity

Leaf extracts of plant is effective against malarial parasites. Plants are known to exert antiplasmodial activity either by causing RBC oxidation or by inhibiting protein synthesis depending on their phytochemical constituents.

Antidyslipidemic activity of polyphenol from coccinia indica

Ethanol extract of coccinia indica showed significant triglyceride (TG) and cholesterol lowering effects in dyslipidemic hamster model. Ethanolic extract was fractionated into chloroform, n-butanol and water soluble fractions and were evaluated. Activity was provided to be concentrated in chloroform-soluble fraction. This

fraction was subjected to frequency column chromatography prepared and polyphenol characterized as 60-polyphenol was isolated. It significantly decreased serum triglyceride, total cholesterol and glycerol. Based on these investigations, it was concluded that the compound polyphenol secluded from leaves of *Coccinia indica* acquired marked antidiabetic activity.

CONCLUSION

Coccinia indica is a famous plant for its safe antidiabetic property. It proved the insulin stimulatory effect of *Coccinia indica* leaves from existing β - cells in diabetic rats. It possesses hypoglycemic, antidiabetic, hypolipidemic, hepatoprotective, larvicidal, anti-inflammatory, analgesics and antipyretic activities. It is found to be devoid of antituberculosis properties. Various phytoconstituents reported are cephalandrol, triacontane, luperol, taraxerol etc. Terpenoids are found to be responsible for anti-diabetic activity. Despite the broad use of *Coccinia indica* in traditional medicine, very few systematic pharmacological and phytochemical studies are reported till date assessing its therapeutic properties.

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