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A REVIEW ON PHARMACOLOGICAL ACTIVITIES OF CITRULLUS COLOCYNTHIS

Pratheeksha B. R.[1], Dr. Rama R. Nargund[1]* and Dr. Sachindra L. Nargund[2]

[1]PG Student, Nargund College of Pharmacy, Bangalore, Karnataka, India.

[*1]Associate Professor, Nargund College of Pharmacy, Bangalore, Karnataka, India.

[2]Principal & Professor, Nargund College of Pharmacy, Bangalore, Karnataka, India.

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***Corresponding Author**
Dr. Rama R. Nargund
Associate Professor,
Nargund College of
Pharmacy, Bangalore,
Karnataka, India.

ABSTRACT

The significance of health and the awareness about the adverse effects of synthetic drugs has made an impact towards the traditional medicines. Medicinal plants are well known for its curative properties for multiple diseases which improves the living conditions. Therefore, the demand for herbal medicines got increased. Among thousands of medicinal plants across the world, one of which is named *Citrullus colocynthis*. An herbaceous plant rich in essential nutrients, plays a significant role in promoting wellbeing. It is a valuable cucurbit plant, which is widely distributed in the desert areas of the world. It is recognized for its wide range of medicinal uses as well as pharmaceutical and nutraceutical potential. *Citrullus colocynthis* has been shown to exhibit multifaceted biological activities such as analgesic, antimicrobial, antidiabetic, anticancer, anticonvulsant, antihyperglycemic, anti-obesity. Various bioactive chemical constituents are also found in this fruit such as alkaloids, glycosides, flavonoids, fatty acids and essential oils. This review suggests that *Citrullus colocynthis* has broad spectrum of pharmacological activity.

KEYWORDS: *Citrullus colocynthis*, analgesic, antimicrobial, antidiabetic, anticancer.

INTRODUCTION

Plants are identified as the most prominent source for medicine and the phytochemicals originating from plants have less degree of adverse effects than synthetic drugs.

Citrullus colocynthis is a herbaceous plant and its commonly called as bitter apple or bitter cucumber which belongs to Cucurbitaceae family. Its widely distributed in East and West tropical Africa, Northern Africa, Egypt, Asia and Australia.[1]

Colocynthine is a prominent ingredient known for the bitterness of this plant. Mainly its used alone or in combination for therapeutic purposes. Different parts of the plant like root, leaf, pulp and seed of bitter apple have been used to treat a number of diseases but the fruit pulp has more beneficial. *Citrullus colocynthis* possess variety of pharmacological properties such as antioxidant, antibacterial, anticancer, anti-inflammatory, analgesic, antimicrobial, antidiabetic, antineoplastic, antitumour, antiallergic, anthelmintic, antidiarrheal, anticonvulsant, antihyperglycemic, antihyperlipidemic, antimycotic, anti-obesity and so on... The phytochemical constituents include alkaloids, glycosides, flavonoids, phenolic compounds and fatty acids. Among these glycosides are said to be the most prominent which can produce dihydroelatericin B (cucurbitacin L) elatericin B (cucurbitacin I) and elaterin (cucurbitacin E) through enzymatic hydrolysis. These compounds also encompass chlorogenic acid, caffeic acid derivatives, cucurbitacin E-, cucurbitacin J-, L-glycosides. Quercetin is also extracted from *Citrullus colocynthis.* Due to the immense therapeutic and nutritional ability of *Citrullus colocynthis* this review was conducted to explore its pharmacological activities.[2]

Table 1: Biological activities of Citrullus colocynthis.

Sl. No	Parts	Biological activity	*In-vitro/ In- vivo*	Method	Ref
1	Fruit	Antioxidant, Hepatoprotective	*In-vitro* *In -vivo*	2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging activity Paracetamol induced hepatoxicity in rats	(3)
2	Fruit, seed, leaves, root	Anticancer	*In-vitro*	Colon, liver, breast, Intestine cell-lines	(4)
3	Seed, dried fruit	Anti-inflammatory, Analgesic	*In-vivo*	Carrageenan induced paw- oedema, Formalin induced nociception in rats	(5)
4	Fruit	Anticancer	*In-vitro*	Pancreatic, skin cell-lines	(6)
5	Fresh leaves	Anti-inflammatory	*In-vivo*	Carrageenan induced paw-oedema in rats	(7)
6	Fruit	Anthelmintic	*In-vitro*	Levamisole and oxfendazole induced helminthiasis	(8)
7	Leaves	Anti-diabetic	*In-vivo*	Alloxan induced diabetes in rats	(9)

8	Fruit	Anti-convulsant	*In-vivo*	Pentylenetetrazol induced seizures in mice	(10)
9	Aerial parts, fruit	Antibacterial	*In-vitro*	*E. Coli, P. mirabilis, S. aureus, S. agalactia*	(11)
10	Fruit, seed, root	Antibacterial Antifungal	*In-vitro*	*Bacteria - S. aureus, B. subtilis, Gram-ve P. aeruginosa and K. pneumonia* *Fungi –F. oxysporum, C. albicans, A. fumigatus and A. Niger*	(12)
11	Seeds	Antiproliferative, Antioxidant, Antibacterial	*In-vitro*	Colorectal adenocarcinoma (HT-29) & breast adenocarcinoma (MDAMB231) cell-lines. Beta carotene bleaching assay. DPPH assay. Gram +ve bacteria-*E. faecalis 471, L. monocytogenes, and S. aureus 476;* *Gram-ve Bacteria - P. aeruginosa, E. coli and S. typhimurium*	(13)
12	Fruits	Anti-ulcer	*In-vivo*	Pylorus ligation induced gastric ulcer in rats	(14)
13	Peel	Antiplatelet Profibrinolytic	*In-vivo*	High fat diet induced obesity in rats	(15)
14	Flesh	Anti-obesity	*In-vitro*	Preadipocyte cell lines	(16)
15	Seeds	Anti mycotoxigenic and antifungal	*In-vitro*	*A. ochraceus* and *A. flavus*	(17)
16	Dried fruit pulp	Neuroprotective and AntiParkinson activity	*In-vivo*	Haloperidol induced catalepsy in rats	(18)
17	Fruit pulp	Anti-hyperuricemic	*In-vivo*	Potassium oxonate-induced hyperuricemic gout in rats	(19)
18	Seed oil	Antihyperlipidemic	*In-vivo*	Studied in normal rabbits	(20)
19	Pulp, seeds	Antioxidant Antidiabetic	*In-vitro* *In-vivo*	α-glucosidase and DPPH inhibition assays Streptozotocin (STZ)induced diabetes in rats	(21)
20	Dried seed oil	Antihyperlipidemic	*In-vivo*	High fat diet induced obesity in rats	(22)
21	Fruit	Antifungal	*In-vitro*	*A. fumigatus* and *A. Niger* and *C. guilliermondii* and *C. kreusei*	(23)
22	Roots	Anti diabetes	*In-vivo*	Alloxan induced diabetes in rats	(24)
23	Seed	Antioxidant	*In-vitro*	DPPH free radical scavenging activity	(25)
24	Leaves	Antioxidant	*In-vitro*	DPPH free radical scavenging activity	(26)
25	Stem	Antioxidant Anti gout arthritis	*In-vitro* *In-silico*	DPPH free radical scavenging activity Molecular docking (TLR2 and TLR4	(27)

				receptors Inhibition)	
26	Leaves	Cardioprotective	*In-vivo*	Doxorubicin induced cardiotoxicity in rats	(28)
27	Leaves	Antioxidant, Anti-fungal, Aphicidal activity	*In-vitro*	DPPH free radical scavenging activity. *Fungi-M. grisea, R. solani, P. infestants* Insects (Aphids)	(29)
28	Roots, stems, leaves, fruits, seeds	Antibacterial, Anticandidal	*In-vitro*	Gram –ve & Gram +ve bacteria - *E. coli, P. aeruginosa, S. aureus, and E. faecalis* *Candida* spp. - *C. glabrata, C. albicans, C. parapsilosis and C. kreusei*	(30)
29	Fruit	Neurotoxicity, Hepatotoxicity	*In-vivo*	Carboplatin induced Neurotoxicity Thalidomide induced hepatotoxicity in rats	(31)
30	Fruit	Anti-depressant	*In-vivo*	Tail suspension test in mice	(32)

CONCLUSION

Citrullus colocynthis is a herbaceous plant, widely distributed in East and West tropical Africa, Northern Africa, Egypt, Asia and Australia. It is a valuable plant, with each part providing distinct health benefits that can contribute to overall well-beingness.

Pharmacological investigations has been revealed that the aerial parts of *Citrullus colocynthis* possess a broad spectrum of therapeutic properties such as antioxidant, antibacterial, anticancer, anti-inflammatory, analgesic, antimicrobial, antidiabetic, antineoplastic, anti-tumour, anti-allergic, anthelmintic, anti-diarrheal, anticonvulsant, antihyperglycemic, antihyperlipidemic, antimycotic, anti-obesity, antidepressant, neurotoxicity, hepatotoxicity, anticandidal, aphicidal, cardioprotective, anti-gout, anti-mycotoxigenic, anti-hyperuricemic activity.

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