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Review Article

A COMPREHENSIVE REVIEW ON VIGNA UNGUICULATA**Vinita Kumari*, Radhika Patel**

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Abstract:

The plant *Vigna unguiculata* belongs to the family Fabaceae/Papilionaceae. It is native to India, Haryana, Punjab, Gujarat and Uttar Pradesh. It grows upto 15-80 cm height, 3-6 inch; long, slender, round, two valved pods. These are herbaceous, erect or sub erect, climbing, prostrate. The plant is known by a variety of names, but cowpea is the most popular worldwide name. In the United States, it is called black-eyed beans, black-eyed peas or southern peas, whereas in Indian and Brazil, it is referred to as lobia and caupi respectively. In tamil, it is called caramunnipayira/ karamani. Every part of this plant is reported to be useful, the leaves, stem, root, legumes of carramunnipayira are edible. *Vigna unguiculata* contains the following constituents such as saponin, thiamine (appreciable amount), riboflavin, niacin, vitamin B6, pantothenic acid and also foliate. It also has small amount of iron, sodium, zinc, selenium, manganese and copper. Carramunnipayira leaves, stem, root and legumes are used for multipurpose in many parts of India and were found to show interesting medicinal properties including diuretic activity, anti-oxidant property, anti-diabetic activity and anti-bacterial activity. The present article summarizes review on the plant, its phytochemistry and its pharmacological activity which have been reported.

Keywords: *Vigna unguiculata*, medicinal uses, phytochemistry, pharmacology**Corresponding author:****Ms. Vinita Kumari,**Department of Pharmacology,
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INTRODUCTION:

Vigna unguiculata is a plant which is cultivated in India and belongs to the family Fabaceae/Papilionaceae.¹ It is a warm-season, annual legume that exhibits a wide range of growth habits. Varieties may be short and bushy, prostrate, or tall and vine like.² The plant is known by a variety of names, but cowpea is the most popular worldwide name. In the United states, it is called black-eyed beans, black-eyed peas or southern peas, whereas in Indian and Brazil, it is referred to as lobia and caupi respectively.³ In tamil, it is called caramunnipayira/karamani.¹ It is found almost in India, Haryana, Punjab, Gujarat and Uttar Pradesh. It is usually grown on marginal lands in Tripura, Assam valley, Andaman and Nicobar islands, cowpea is grown on a limited scale in rice fallow where black pepper and coconut palms are grown together, which is grown as fodder crop. It is warm season, annual legume. The upright stems are hollow and hairless. (Fig.1), Flowers are purple or white bell shaped⁴



Fig 1: *Vigna unguiculata* seeds

Taxonomic Classification⁵

Botanical name	: <i>Vigna unguiculata</i>
Family	: Fabaceae/ Papilionaceae
Sub family	: Faboideae
Order	: Fabales
Tribe	: Phaseoleae
Sub tribe	: Phaseolinae
Kingdom	: Plantae
Sub kingdom	: Vascular plants
Division	: Magnoliophyta
Class	: Magnoliopsida
Sub class	: Rosidae
Origin	: Bangladesh
Genus	: <i>Vigna</i>
Species	: <i>unguiculata</i> .

Macroscopy of seeds

V. unguiculata showed reniform shaped seed. The sculpturing pattern on seed coat surface of both wild and cultivated species of *V. unguiculata* is maculo-reticulate type. Wild seed color is black and cultivated is cream in color⁶. Seeds shape reniform, 5–6 mm long, 3–4 mm broad and 2–3 mm in thickness, compressed with a polished or shiny and

hard brown coloured testa. The micropyle is situated near the hilum. The hilum is 1–1.5 mm in length. The seed are exalbuminous. The testa is tough but comparatively thin except at the region of the hilum. The embryo which was exposed after removing the testa, by softening it through emersion of the seed in water, consists of two fleshy cotyledons, 5–6 mm long and 4–5 mm wide and an incurved radical which was 4 mm long⁷.

Chemical constituents:

Generally plant contains Carbohydrates (56-67%), Proteins (20.5-31.7%), Fats (1.14-3.03%) vitamins, minerals, soluble and insoluble dietary fibers with varying amount of glycosides, alkaloids, flavonoids, tannins, polyphenols, saponins, vignalin, the aglycone part of which belongs to the oleanane series of triterpenoids identified as soyasapogenol B. Besides saponincycloartenol, stigmasterol, oleanolic acid acetate and sitosterol β -D-glycosides⁸.

Medicinal Uses

The seeds are edible and used as the source of dietary protein. They also used to strengthen the stomach and destroy the worms in stomach. The plant is used in measles, smallpox, adenitis, burns and sores. Decoction or soup is used in affection of the liver and spleen, intestinal colic, in leucorrhoea and menstrual disorder, urinary discharges⁹. It is used as astringent, appetizer, Antipyretic, Diuretic, laxative, aphrodisiac, diuretic, anti-hyperglycemic, antinociceptive, galactagogue and liver tonic. It exhibits thrombolytic, antisickling, antioxidant and free radical scavenging activities. Also exhibits Antibacterial activity against both the Gram positive and Gram negative organisms. Useful in jaundice, epilepsy, anorexia, constipation. Globulin fraction of the seed showed hypolipidaemic effects in rats¹⁰.

Pharmacological activity**Antinociceptive activity**

Antinociceptive activity was examined through the observation of decrease in abdominal constrictions in intraperitoneally administered acetic acid-induced pain model in mice. Administration of methanol extract of beans results in dose dependent and significant decreases in blood glucose levels in glucoseloaded mice¹¹. The tests for antinociceptive activity results, that the methanolic extract decreases the number of abdominal constrictions by 30.0, 33.3, 36.7, and 43.3%, respectively in all above four doses. This study concluded that the beans can be a good source for alleviating pain and for lowering blood sugar in diabetic patients¹².

Antibacterial activity

Aqueous and ethanolic extracts of seeds of *Vigna Unguiculata* (L) Walp were studied for antibacterial activity and was tested against Gram positive

bacteria, *Bacillus subtilis* and Gram negative bacteria, *Escherichia coli* by agar well diffusion method. Different concentrations (100 µg/ml, 200 µg/ml and 300 µg/ml) of the extracts were incorporated into the wells. Both the extracts showed concentration dependent activity against the microorganisms investigated¹³. The results showed the highest positive antibacterial activity with an inhibition diameter of 22 mm in case of aqueous extract of 300 µg/ml concentration, against the Gram negative bacteria; *Escherichia coli*. The *E. coli* species were found to be more sensitive than that of the *Bacillus subtilis*. The aqueous extract exhibited more antibacterial activity against both the Gram positive and Gram negative organisms than that of the ethanolic extract.

Anthelmintic activity

Vigna Unguiculata (L) Walp. seeds are coarse powdered and exhaustively with hot solvent (Soxhlet) extraction by ethanol and maceration with chloroform water I.P. Five concentration (10-100 mg/ml) of ethanolic and aqueous extracts were studied for anthelmintic activity by using *Edriluseuginae* earthworms. Both aqueous and ethanolic extracts showed paralysis and death of worms in concentration (10-100mg/ml) dependent manner¹⁴. Alcoholic extract of *Vigna Unguiculata* (L) Walp showed significant activity than aqueous extract. Piperazine citrate (10mg/ml) and distilled water were included in the assay as standard drug and control respectively. The result showed seeds of *Vigna Unguiculata* (L) Walp possessed potential anthelmintic activity.

Antioxidant activity

In screening of antioxidant activity of the methanolic extracts of cowpea (*Vigna unguiculata* (L) Walp.) seeds. Phenolic compounds present in the extracts showed the antioxidant and antiradical properties when investigated using a linoleic acid peroxidation model, FRAP, ORAC and TRAP assays, as well decoction of dry seeds in calculus and amenorrhea. Presence of vitamin A in the green pods makes them a valuable diet for children. Green leaves may be used in vitamin C deficiency¹⁵.

Antimicrobial activity

The antimicrobial activity of *Vigna unguiculata* (L) Walp seed oil was investigated against five Gram positive bacteria (*Bacillus megaterium*, *Bacillus subtilis*, *Sarcinalutea*, *Salmonellatyphi* and *Staphylococcus aureus*) and four Gram negative (*Escherichia coli*, *Shigelladysenteriae*, *Shigellasonnei*, *Shigellashiga*) and four fungi (*Penicilium spp.*, *Mucor spp.*, *Candida albicans* and *Aspergillusfumigatus*)¹⁶. Oil at the concentration of 400 µg/disc showed the highest activity against *Sarcinalutea* (19±0.1 mm) and *Staphylococcus aureus* (16±0.1 mm). Oil is active against the three

tested fungi namely *Penicilium spp.*, *Mucor spp.* and *Candida albicans* but showed no sensitivity against *Aspergillusfumigatus*¹⁷.

Antidiabetic activity

The seed oil of *Vigna Unguiculata* (L) Walp was investigated for its anti-diabetic activity against alloxan monohydrate induced diabetes in rats. Levels of blood glucose, TC, TGs, LDL, ALT, AST and ALP decreased and HDL increased in alloxan induced diabetic rats after treatment with 200 mg/kg barbati seed oil for 21 days^{18, 19}. The study reported that the seed oil of cow pea may be very useful for the improvement of the complications of diabetes.

Hypocholesterolemic activity

The seeds of *Vigna Unguiculata* (L) Walp was investigated for its Hypocholesterolemic activity in Wistar rats. Rats were grouped and fed a high fat diet with 20% Bombay (BO), 20% MI 35 (MI), 20% Cowpea extract, 20% Dawala (DA) in comparison with 20% casein (HFD). Serum total cholesterol, non-HDL cholesterol, triacylglyceride and glucose concentrations were analyzed. Serum lipids and glucose concentrations in cowpea fed rats were significantly lower ($P < 0.05$) than HFD²⁰. Therefore, raw cowpea produced significant hypolipidemic and hypoglycemic effects in Wistar rats.

Antiviral and antifungal activity

The *vigna unguiculata* (L) Walp seeds were examined for the presence of various proteins and amino acids with antiviral and antifungal potency. The two proteins, designated α - and β antifungal proteins according to their elution order from the CM-Sepharose column, were capable of inhibiting human immunodeficiency virus (HIV) reverse transcriptase and one of the glycohydrolases associated with HIV infection, α -glucosidase, but β -glucuronidase was not repressed²¹. The ability of the proteins was also demonstrated in order to retarding mycelial growth of a variety of fungi, and α -antifungal protein being proved more potent in most cases. β -Antifungal protein was highly active in only one instance. Both antifungal proteins had low cell-free translation-inhibitory activity²².

Thrombolytic activity

Methanolic extract of seeds of *Vigna unguiculata* was very much efficient and potent for finding the thrombolytic activities. The following extraction of *Vigna unguiculata* was carried out in room temperature and divided into different concentration 2mg/ml, 4mg/ml, 6mg/ml, 8mg/ml, 10mg/ml respectively in where streptokinase can be used as positive control and distilled water can be used as negative control by using in vitro model²³. The plant extract gave significant results of clot lysis, i.e. concentrations 12.01 ± 1.50 at 2 mg/ml, 16.48 ± 2.31

at 4 mg/ml, 24.88 ± 1.49 at 6 mg/ml, 31.24 ± 0.68 at 8 mg/ml, 40.33 ± 3.64 at 10 mg/ml, in where the standard as streptokinase shown 58.41 ± 3.71 and negative control as distilled water shown $2.56 \pm 1.23\%$. So based on the research study it is clear that this plant extract provide best result as thrombolytic effect cum activities among the standard²⁴.

Antisickling activity

Natural plant products have been used in Nigerian folk medicine in the management of sickle cell anemia by inhibiting sickling. This work was therefore aimed at investigating the Antisickling potential of the ethanol seed extract of *Vigna unguiculata* used in the Nigerian herbal medicine with a view of proposing an effective herbal recipe for the management of sickle cell disease²⁵. Sickling inhibition test, sickling reversal test and polymerization test were carried out using standard methods. The results of the antisickling test showed that *Vigna unguiculata* had significantly increased delayed time before polymerization at 50, 25 and 12% concentrations compared to the control. From the results, the extracts *Vigna Unguiculata* have shown to be therapeutically beneficial in the management of sickle cell disease and thus it is strongly recommended by this study to be developed into supplements for the management of sickle cell disease^{26, 27}.

CONCLUSION:

From ancient days, medicinal plants shown an important feature to relieve different types of diseases. *Vigna unguiculata* (Cowpea) is very important plant specifically in respect of thrombolytic and antisickling activities. Although the plant is having another different vital activities like anthelmintic, antilipidemic, antidiabetic, antibacterial, antifungal, antiviral, antioxidant due to potential cum rich source of vitamin A, vitamin C, flavonoids, riboflavin, zinc, copper, magnesium, calcium, sodium, phosphorus, thiamine, amino acid, phytic acid, alkaloids, saponins, fats, resins, terpenoids, glycosides in the seeds and leaves of the plant. The plant has good future prospective for discovery of new molecules and pharmacological activities.

REFERENCES:

1. Heuzé V, Tran G. Cowpea (*Vigna unguiculata*) seeds. Feedipedia, a programme by INRA, CIRAD, AFZ and FAO.
2. Pandey MM, Rastogi S, Rawat AK; Indian herbal drug for general healthcare: An overview. Internet J Altern Med. 2008; 6:1.
3. Ibrahim S et al. Pharmacological activities of *Vigna unguiculata* (L) Walp: A review. International Journal of Pharma and Chemical Research. 2017; 3(1):44-49.
4. Acevedo-Rodriguez P. Vines and climbing plants of Puerto Rico and the Virgin Islands (Number 51), Washington, DC: Department of Botany, National Museum of Natural History, 2005.
5. Rasika K et al. Pharmacognostical and phytochemical evaluation of *Vigna unguiculata* Linn. (Kulattha) seed. Global Journal of Research on Medicinal Plants & Indigenous Medicine. 2012; 1(3):69-76.
6. Hardwick S. Botanical analysis of selected historically occupied cave sites in the Limpopo province, South Africa, in Faculty of Science, University of the Witwatersrand: Johannesburg, 2013. 11.
7. Ogunlade I, Ogunleye R T, Osasona I. Chemical Composition, Antioxidant Capacity and Total Phenolic Content of the Flours Obtained from Cow Pea (*Vigna unguiculata*) Varieties Commonly Consumed in Nigeria. 2014; 5.
8. Dinesh V, Bembrekar SK, Sharma P. Herbal formulations used in treatment of kidney stone by native folklore of Nizamabad District, Andhra Pradesh, India. Bioscience Discovery. 2013; 4(2):250-253.
9. Sandeep D. Evaluation of Antibacterial activity of seed extract of *Vigna unguiculata*. International Journal of Pharmacy and Pharmaceutical Sciences. 2014; 6(1):75-77.
10. Perumal Siddhuraju, Klaus Becker. The antioxidant and free radical scavenging activities of *Unguiculata* processed (L) Walp *Vigna* seed extracts. Food Chem. 2007; 101(1):10-9.
11. Maisale AB, Patil MB, Jalalpure SS, Attimarad SL. Phytochemical properties and Anthelmintic activity of *Vigna Unguiculata*. J Innovat. 2012; 1(2):51-2. Pharm Sci
12. Doppalapudi Sandeep. Evaluation of Antibacterial activity of seed extract of *Vigna Unguiculata*. Int J Pharm Pharm Sci. 2014; 6(1):75-7.
13. Muhammad Zia-Ul-Haq, Shakeel Ahmad, Ryszard Amarowicz, Vincenzo De Feo; Antioxidant Activity of the Extracts of Some Cowpea (*Vigna unguiculata* (L) Walp.) Cultivars Commonly Consumed in Pakistan. Molecules 2013 5; 18(2): 2005-17.
14. Tazin TQ, Rumi JF, Rahman S, Al Nahain A, Jahan R, Rahmatullah M. Oral glucose tolerance and antinociceptive activity evaluation of methanolic extract of *Vigna unguiculata*. World journal of pharmacy and pharmaceutical sciences, 2014; 3(8): 28-37.
15. Ashraduzzaman M et al. *Vigna unguiculata* Linn. Walp. seed oil exhibiting antidiabetic effects in alloxan induced diabetic rats. Malaysian Journal of Pharmaceutical Sciences. 2011; 9(1):13-23.

16. Zia-Ul-Haq M et al. Antioxidant activity of the extracts of some cowpea (*Vigna unguiculata* (L.) Walp.) cultivars commonly consumed in Pakistan. *Molecules*. 2013; 18(2):2005-2017.
17. Hussain MS et al. In vitro thrombolytic potentials of methanolic extract of *Vigna unguiculata* Linn (seed). *Journal of Pharmacognosy and Phytochemistry*. 2016; 5(3):129-131.
18. Siddhuraju P, Becker K. The antioxidant and free radical scavenging activities of processed cowpea (*Vigna unguiculata* (L.) Walp.) Seed extracts. *Food Chemistry*. 2007; 101(1):10-19.
19. Weththasinghe P et al. Hypcholesterolemic and hypoglycemic effect of cowpea (*Vigna unguiculata* L. Walp) incorporated experimental diets in wistar rats (*Rattus norvegicus*). *Agriculture and Agricultural Science Procedia*. 2014; 2:401-405.
20. Ye X, Wang H, Ng T. Structurally dissimilar proteins with antiviral and antifungal potency from cowpea (*Vigna unguiculata*) seeds. *Life Sciences*. 2000; 67(26):3199-3207.
21. Souza GS et al. Activity of recombinant and natural defensins from *Vigna unguiculata* seeds against *Leishmania amazonensis*. *Experimental Parasitology*. 2013; 135(1):116-125.
22. Ashraduzzaman M et al. Antimicrobial Activity of *Vigna unguiculata* L. Walp Seed Oil. *International Journal of Biotechnology for Wellness Industries*. 2016; 5(3):70-75.
23. Kritzinger Q et al. Antimicrobial activity of cowpea (*Vigna unguiculata*) leaf extracts. *South African Journal of Botany*. 2005; 71(1):45-48.
24. Chnadrsekaran S, Rajkishore VB, Ramalingam R. Evaluation of diuretic activity on the leaves of *Vigna unguiculata*. *International Journal of Advanced Research and Development*. 2016; 1(4):98-100.
25. Mpiana P et al. In vitro antisickling activity of anthocyanins extracts of *Vigna unguiculata* (L.) Walp. *Chemistry and Medicinal Value*. 2009; 25:91-98.
26. Janeesh P, Abraham A. *Vigna unguiculata* modulates cholesterol induced cardiac markers, genotoxicity and gene expressions profile in an experimental rabbit model. *Food & Function*. 2013; 4(4):568-574.
27. Allah NSK et al. Phytochemical screening and hypolipidemic activity of extracts from seeds and leaves of *Vigna unguiculata* growing in Sudan. *Journal of Pharmacognosy and Phytochemistry*. 2017; 6(3):488-491.
28. Simeone EI et al. Antisickling potential of the ethanol seed extracts of *Vigna unguiculata* and *Vigna subterranean*. *International Journal of Biochemistry and Biotechnology*. 2012; 9:226-229.
29. Nderitu KW et al. Antiobesity activities of methanolic extracts of *Amaranthus dubius*, *Cucurbita pepo*, and *Vigna unguiculata* in progesterone-induced obese mice. *Evidence-Based Complementary and Alternative Medicine*, 2017, 10.
30. Dinesh V, Bembrekar SK, Sharma P. Herbal formulations used in treatment of kidney stone by native folklore of Nizamabad District, Andhra Pradesh, India. *Bioscience Discovery*. 2013; 4(2):250-253.