Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2020; 9(1): 1349-1352
Received: 16-11-2019
Accepted: 21-12-2019

Mehreen Zaheer
Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, University of Karachi, Karachi, Pakistan

Salman Ahmed
Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, University of Karachi, Karachi, Pakistan

Muhammad Mohtasheemul Hassan
Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, University of Karachi, Karachi, Pakistan

Corresponding Author:
Muhammad Mohtasheemul Hassan
Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, University of Karachi, Karachi, Pakistan

Vigna unguiculata (L.) Walp. (Papilionaceae): A review of medicinal uses, Phytochemistry and pharmacology

Mehreen Zaheer, Salman Ahmed and Muhammad Mohtasheemul Hassan

Abstract
Vigna unguiculata (L.) Walp. (Papilionaceae) is a medicinally important plant and is used for the treatment of different diseases. Alkaloids, phenols, flavonoids and phytic acid have been reported from this plant. Antioxidant, antidiabetic and hypocholesterolemic activities are reported by *Vigna unguiculata.* The present review is an attempt to compile all the previous data on the basis of its medicinal uses, phytochemistry and pharmacology reported in the previous articles.

Keywords: *Vigna unguiculata*, medicinal uses, phytochemistry, pharmacology

Introduction
Vigna unguiculata (L.) Walp. is a leguminous plant belongs to the family Papilionaceae. It is originated from Africa and is grown widely all over the world including Nigeria, India, Central America, China and Africa. It is an edible legume. The seeds and leaves are a major source of plant proteins and vitamins for man and feed for animals [1, 2].

Fig 1: *Vigna unguiculata* seeds

Table 1: Names of *Vigna unguiculata* in different languages: [1, 3-5]

Languages	Names
Arabic	اللوبياء
Bengali	Ghangra, Kulattha, Kalaya, Barbati
English	Cowpea, Black-eye pea, Horse gram, Asparagus bean, Catjang, Catjang cowpea, Chinese long bean, Clay pea, Cream pea, Crowder pea, Pea bean, Purple-Hull pea, Southern pea, Sow pea, Yard-Long bean
French	Dolique asperge, Dolique mongette, Haricot asperge, Haricot indigène, Niébé, Pois à vaches
Ghana	Adua, Ayi, Tipielega, Tuya, Saau
Gujrati	Kalathi, Kulathi
Hindi	Lobia, Kulathi, Kurathi
Indonesian	Kacang bol, Kacang merah, Kacang toonggak, Kacang béngkok
Kannada	Alasabde, Alasund, Huruli, Hurali
Kashmiri	Kath
Malayalam	Mudiraa
Marathi	Alasunda, Chavali
Nigeria	Wake, Ezo, Nyebbe, Ngalo, Azzo, Dijok, Alev, Arebe, Lubia, Mongo, Ewa, Akedi, Akoti
Portuguese	Feijão-espargo, Feijão-fradinho
Punjabi	Lodhar
Sanskrit	Mahamasah, Rajamasah, Khalva, Vardhipatraka
Spanish	Costeño, Frijol de costa, Judía catjang, Judía espárrago, Rabiza
Swahili	Kunde
Tamil	Kaattuulundu, Karamani
Telugu	Alasandalu, Kaaraamanulu
Urdu	Gawara, Gawar ka beej

Table 2: Taxonomy [2, 6]

Kingdom	Plantae
Family	Papilionaceae
Subfamily	Faboideae
Tribe	Phaseolae
Sub tribe	Phaseolinae
Genus	*Vigna*
Species	*unguiculata*
Synonyms	*Dolichos biflorus* L.
	Dolichos catjang Burm.f.
	Dolichos hastifolius Schnizl.
	Dolichos lubia Forssk.
Plant	Annual herb with twining stem, 3-5m in length.
Leaves	Trifoliolate, 5-25 cm long
Inflorescence	Racemes
Flower	Axillary racemes on stalks 15 to 30 cm long
Fruit	Pendulous, smooth, 10 to 23 cm long with a thick curved beak
Seeds	10- to 15-seeded, 4 to 8 mm long, 3 to 4 mm broad, reddish brown or white with a black spot

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 color [7].

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 long [8].

Table 3: Nutritional value of seeds [1, 9]

Essential minerals (mg / 100 g)		**Amino acid (%)**	
Macro-minerals		Alanine	18.7
Calcium	126	Arginine	14.3
Magnesium	51	Aspartic acid	27.8
Phosphorus	53	Cysteine	3.6
Potassium	431	Glutamic acid	43.5
Sodium	4	Glycine	9.5
Micro-minerals		Histidine	4.5
Iron	1.10	Isoleucine	5.3
Zinc	1.01	Leucine	5.4
Vitamins (mg / 100 g)		Lysine	0.5
Ascorbic acid (C)	2.5	Methionine	3.2
Thiamin (B_1)	0.110	Phenylalanine	5.5
Riboflavin (B_2)	0.145	Proline	17.6
Niacin (B_3)	1.450	Serine	2.6
Pyridoxine (B_6)	0.067	Threonine	3.3
Vitamin A, IU	817 IU/100g	Tryptophan	0.5
-------	-----	Tyrosine	0.5
		Valine	0.8

Traditional medicinal uses

Roasted seeds are used to treat neuritis, insomnia, weakness of memory, dyspepsia, indigestion, needles in limbs and sensation of pins. It is an admirable medicine for stomatitis, corneal ulcers and coeliac disease. *V. unguiculata* is a rich source of amino acid and protein and some of the amino acids play an important role in the management of sickle cell disease. Seeds have cardioprotective potency and also preventing cardiovascular diseases. Decoction of leaves is used to treat as hyperacidity, nausea and vomiting [3]. The seeds are used medicinally to treat burns, chest pains, epilepsy, fever, headaches and menstruation and in childbirth [10]. The plant is used in measles, smallpox, adenitis and sores. Decoction or soup is used in affection of the liver and spleen, intestinal colic, in leucorrhoea and urinary discharges. The seeds are used as astringent, antipyretic, diuretic and also used in cardiovascular diseases. Green leaves may be used in vitamin C deficiency syndrome [1]**.** 100 ml decoction of *V. unguiculata* seeds taken orally twice a day for 30 days to dissolve kidney stones [11].

Table 4: Phytochemistry and Pharmacology

Part (Extract)	Compounds	Activity
Seeds (aqueous)	----------	Antibacterial [12], hepatoprotective [13]
Seeds (ethanol)	----------	Anthelminthic [14], anti-atherosclerotic [15], antisickling activity [16], hypolipidemic [17]
Seeds (methanol)	Phenolic compounds (chlorogenic acid, caffeic acids and condensed tannins)	Anti oxidant [18]
	----------	Antibacterial [19], anti nociceptive, antidiabetic [20], thrombolytic [21]
Seeds	Total phenolics, tannins	Anti oxidant [22]
Seeds powder (20 % incorporated in diet)	----------	Hypocholesterolemic, hypoglycemic [23]
Seeds	α- and β-antifungal proteins	HIV-1 reverse transcriptase and α-glucosidase inhibitor [24]
	Antimicrobial peptides	Antiparasitic [25]
Seed oil	----------	Antimicrobial [26]
Leaves (ethanol)	----------	Antimicrobial [27]
		Diuretic [28]
	Anthocyanins	Antisickling activity [29]
Leaves	Flavonoids	Antihyperlipidemic, cardioprotective [30]
Whole plant (methanol)	----------	Antiobesity [31]
Whole plant	Peptide	Antidiabetic [32]

Conclusion

The traditional uses, pharmacology and phytochemistry of *V. unguiculata* presented in this review could be helpful for future studies and research. The plant has good future prospective for discovery of new molecules and pharmacological activities.

References

1. Gupta N *et al*. Phytochemical evaluation of Moth Bean (*Vigna aconitifolia* L.) seeds and their divergence. Biochemistry Research International, 2016, 6.
2. 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.
3. Singh A *et al*. Review on standardization and phytochemical of *Vigna unguiculata*. International Journal for Pharmaceutical Research Scholars. 2015; 4(2):506-516.
4. Heuzé V, Tran G. Cowpea (*Vigna unguiculata*) seeds. Feedipedia, a programme by INRA, CIRAD, AFZ and FAO. https://www.feedipedia.org/node/232, 2015. [cited 2018 Jan, 26].
5. 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.
6. 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.
7. Nath D, Dasgupta T. Study on seed coat of some Vigna species following scanning electron microscopy (SEM). International Journal of Scientific and Research Publications. 2015; 5(9):1-6.
8. 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.
9. USDA. Basic Report: 11196, Cowpeas (blackeyes), immature seeds, frozen, cooked, boiled, drained, without salt. National Nutrient Database for Standard Reference Release 28. 2016. [cited 2018 Jan, 27]; Available from: https://ndb.nal.usda.gov/ndb/foods/show/2949.
10. 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. 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.
12. Sandeep D. Evaluation of Antibacterial activity of seed extract of *Vigna unguiculata*. International Journal of Pharmacy and Pharmaceutical Sciences. 2014; 6(1):75-77.
13. Ibrahim S *et al*. Hepatoprotective potential of aqueous extract of *Vigna unguiculata* (L) Walp seeds against paracetamol induced hepatotoxicity in rats. International Journal of Pharma and Chemical Research. 2017; 3(3):456-461.
14. Maisale B *et al*. Phytochemical properties and anthelmintic activity of *Vigna unguiculata* Linn. Journal of Pharmaceutical and Scientific Innovation. 2012; 1(2):51-52.
15. Azizah I *et al*. The effects of *Vigna unguiculata* on aortic endothelial cells, endothelial nitric oxide synthase expression, lipid profile, and atherosclerosis in ovariectomized rats. Journal of Experimental and Integrative Medicine. 2014; 4(3):207-211.
16. 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.
17. 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.
18. 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.
19. Chaurasia S, Saxena R. Antibacterial activity of four different varieties of green beans. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 2012; 3(3):70-74.
20. Tazin T *et al*. Oral glucose tolerance and antinociceptive activity evaluation of methanolic extract of *Vigna*

unguiculata ssp. unguiculata beans. World Journal of Pharmacy and Pharmaceutical Sciences. 2014; 3(8):28-37.
21. 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.
22. 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.
23. Weththasinghe P *et al*. Hypocholesterolemic 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.
24. 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.
25. Souza GS *et al*. Activity of recombinant and natural defensins from *Vigna unguiculata* seeds against Leishmania amazonensis. Experimental Parasitology. 2013; 135(1):116-125.
26. 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.
27. Kritzinger Q *et al*. Antimicrobial activity of cowpea (*Vigna unguiculata*) leaf extracts. South African Journal of Botany. 2005; 71(1):45-48.
28. Chnadrasekaran 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.
29. Mpiana P *et al*. *In vitro* antisickling activity of anthocyanins extracts of *Vigna unguiculata* (L.) Walp. Chemistry and Medicinal Value. 2009; 25:91-98.
30. 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.
31. 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.
32. Barnes M, Uruakpa F, Udenigwe C. Influence of cowpea (*Vigna unguiculata*) peptides on insulin resistance. Journal of Nutritional Health & Food Science. 2015; 3(2):1-3.