

Available online on 15.06.2021 at <http://jddtonline.info>

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

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Review Article

Medicinal Properties of *Māsh* (*Vigna mungo* (Linn.) Hepper): A Comprehensive Review

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Article Info:



Article History:

Received 09 April 2021
Review Completed 23 May 2021
Accepted 29 May 2021
Available online 15 June 2021

Cite this article as:

Khan F, Nayab M, Ansari AN, Zubair M, Medicinal Properties of *Māsh* (*Vigna mungo* (Linn.) Hepper): A Comprehensive Review, Journal of Drug Delivery and Therapeutics. 2021; 11(3-S):121-124
DOI: <http://dx.doi.org/10.22270/jddt.v11i3-S.4888>

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Abstract

Māsh (*Vigna mungo* (L.) Hepper) belongs to the family Papilionaceae. It is one of the important legume crops extensively cultivated in India and other parts of the world. Pulses and legumes have been gaining interest because they are an excellent source of bioactive compounds. The objective of this present review is to compile all relevant information regarding the medicinal uses of *Vigna mungo*. It is rich in flavonoids, isoflavonoids, phytoestrogens, phenolic acids, enzymes, fibers, starches, trypsin inhibitors, phytic acid, lectins, saponins, tocopherols, fatty acids, and proteins. Most of the reported components are from the seed part of the black gram. Various processes like cooking, soaking, and germination affect bioactive components. Studies have shown the presence of bioactive compounds in other parts of the plant like leaves, pods, roots, stems, etc. which are normally considered as a waste product. Hence there is a need to isolate and characterize novel bioactive components from other parts of the black gram plant. This review demonstrates that *Vigna mungo* is rich in bioactive components and able to cure and prevent diseases in addition to its basic nutritional value.

Keywords: *Māsh*, *Vigna mungo*, black gram, bioactive components, legumes

INTRODUCTION

Māsh bean (*Vigna mungo* (L.) is one of the important legume crops extensively cultivated in India and other parts of the world from ancient times¹. The name of the *Vigna* genus is derived from an Italian botanist of the 17th century *Dominico vigna*. It comprises around 150 species². Its name in most languages of India derives from Proto-Dravidian *uz-untu-*, borrowed into Sanskrit as *uḍida*³. India is the largest producer and consumer of pulses. Apart from proteins, pulses are good sources of micronutrients and dietary fiber. Black gram is a high-value pulse that contains 25-38 g protein per 100 g. It is used in several Indian cuisines in its whole, fermented, and powdered form⁴. Black gram is grown on soils inclined to be clayey and on black cotton soil, it is harvested before the pods are fully ripe, processed in the form of splits or dal⁵. Its shelf life is 3 years⁶. Black lentil is usually the whole *urad* bean, whereas the split bean (the interior being white) is called white lentil. Black gram is very nutritious. Three taxa are distinguished within *Vigna mungo*: var. *mungo*, var. *viridis*, and var. *silvestris*⁷. The seeds are well-known due to their therapeutic and nutritional potential^{5,8}. Besides, it also plays an important role in sustaining soil fertility by fixing atmospheric nitrogen⁹.

Black gram stands fourth in production and acreage in Indian Agriculture¹⁰. It is grown throughout India as a pulse crop¹¹ and cultivated as a component of various cropping systems that cover over four million hectares, principally in India, Myanmar, Pakistan, Bangladesh and Thailand¹². Most Black gram cultivars produce black-coloured seeds which are rich in proteins in addition to lysine and phosphoric acid¹³.

TAXONOMY^{3,5,7,8,11,14,15,16,17,18,19}

Kingdom: Plantae

Scientific Name: *Vigna mungo* (Linn.) Hepper

Synonyms: *Phaseolus radiates* Roxb. *Phaseolus mungo* Linn. *Azuki mungo* (L.) Masam. *Phaseolus hernandezii* Savi *Phaseolus mungo* L. *Phaseolus roxburghii* Wight & Arn. In different languages, it is known by different names presented in Table No. 1

Family: Fabaceae^{3,18,19} (Leguminosae)^{16,20} Papilionaceae (Leguminosae - Papilionoideae, Fabaceae)^{7,8,14}

Genus: *Vigna*

Species: *V. mungo*



Figure 1: Māsh (*Vigna mungo*): Plant and its seed

MATERIAL AND METHODS

Pubmed, Medline, and Google Scholar databases were searched for the published articles with *māsh*, *Vigna mungo*, black gram, *Urad*, flavonoids, isoflavonoids, etc. Relevant clinical trials and review articles published in peer-reviewed journals were included in this review article. *Unāni* literature

was extracted from the classical *Unāni* textbooks like *Al-Qanoon Fit-Tibb* (English Translation), *Muhit-i-Azam*, *Makhzan-ul-Mufradat*, *Khazain-Ul-Advia*, *Al-Jami ul mufradat al-adwiya wa al-aghdiya*, *Kitab al-Miah fit-Tibb*, *Qarabadin-i-Sarkari*, *Kitab-al-Umda fil-Jarahat*, etc.

Table 1: Name of *Vigna mungo* in different languages ^{3,5,6,7,11,13,14,15,16,17,18,21,22,23,24,25}

S. No	Language	Name	S. No	Language	Name
1.	Arabic	<i>Māsh</i>	2.	Kannada	Uddu
3.	English	Black gram	4.	Marathi	Uḍid, Maga
5.	Hindi	Uṛad	6.	Tamil	Ulundu, Ulunthu
7.	Bengali	Mash-kalai	8.	Malyalam	Uḷhunnu, Ulnnu
9.	Gujarati	Aḍad, Arad	10.	Sanskrit	Masah
11.	Persian	Bano <i>Māsh</i>	12.	Urdu	Uṛad
13.	Sanskrit	Masa	14.	Telgu	Minumulu, karuminimulu, nallaminimulu, Uddulu

PARTS USED

Roots, seeds, fruit ^{18,24,26}

MIZĀJ (TEMPERAMENT):

Moderately moist and dry ²⁷.

Cold and dry in the first degree ^{6,22,23,28,29}.

Cold in the first degree ³⁰.

Cold in the second degree, moderately moist and dry ³¹.

Hot and moist ²¹.

BOTANICAL DESCRIPTION

An erect, hairy annual plant, height varying from 30-90 cm with long twinning branches, leaves trifoliate, leaflets ovate 5-10 cm long, small flowers with elongating peduncles, cylindrical fruit pods, hairy with a short-hooked beak, seeds usually 4 but maybe 1 in a pod, generally black with white hilum protruding from the seeds. It has a taproot that

branches to form branched roots. It is sweet to taste and hot in potency ^{5,18}. The ellipsoid, usually black seed is up to 5mm long with square ends and raised and concave hilum, usually black or mottled ⁷. Sometimes the plant adopts a twinning habit ^{17,25}. Flowers are bisexual, papilionaceous, small; bracteoles linear to lanceolate, exceeding the calyx. Flowers are yellow and in dense clusters ^{14,17}.

GEOGRAPHICAL DISTRIBUTION (HABITAT)

Black gram is grown mainly in Central and Southeast Asia. It is widely distributed in tropical West Africa and extensively cultivated all over India ^{5,7,14,16,18,25}. The Guntur District ranks first in Andhra Pradesh for the production of black gram in India ³.

PROPAGATION

By seeds ^{7,17,25}

AF'ĀL (ACTIONS)

Roots are narcotic and are reported to be used by the Santals as a remedy for aching bones⁵. Seeds are sweet, emollient, diuretic, nutritious, thermogenic, tonic, galactagogue, laxative, aphrodisiac, styptic, appetizer, and nervine tonic^{1,8,14,18,19,20}. When used externally it acts as *Tahlil-i-Awrām* (dissolvent), *Jālī* (corrosive), *Musakkin-i-Alam* (analgesic)²¹ and *Mulayyin* (laxative)³⁰. The plant leaves may possess anti-inflammatory, analgesic, and ulcerogenic properties among others¹⁶. In traditional medicine, the seed is used for its suppurative, cooling, and astringent properties²⁵.

ISTI'MĀLĀT (THERAPEUTIC USES)

Used in rheumatism, paralysis, aching bones, affections of the nervous system, and diseases of the liver^{1,2,5,11,14,16,32}. It is medicinally used both internally and externally, internally used in the form of decoction in dyspepsia, strangury, constipation, hepatopathy, neuropathy, and agalactia.^{2,18,19} Externally as a poultice, also in gastritis, dysentery, and rheumatism¹. Used as plaster in case of organic pain, also applied on muscular contusions and rupture^{27,33}. It is used as foment in painful conditions^{21,22}. It also removes viscous phlegm and abnormal bile and produces good humour and moderate heat in the body^{6,23}. Pure black gram cake known as idli is used as a night diet for diabetics¹. In traditional medicine, it is ground into a powder, moistened, and applied as a poultice on abscesses. The seed flour is rich in saponins and can be used as a soap substitute. The plant can fix atmospheric nitrogen hence it is grown in some areas as green manure^{7,17,25}.

MUDIRRĀT (SIDE EFFECTS)

Flatulence²¹. People with cold temperament⁶

MUSHILĀT (CORRECTIVES)

Black pepper (*Piper nigrum*), sugar²¹, Cumin (*Cuminum cyminum*), cloves (*Syzygium aromaticum*), cinnamon and ginger (*Zingiber officinale*)^{6,22}

BADAL (SUBSTITUTE)

Broad bean (*Bakla*) (*Vicia faba* L.)^{6,22}

MIQDĀR-I-KHŪRĀK (DOSAGE)

10 g²¹. Used in the form of decoction, powder, paste, etc¹⁹, 3 g for a massage with some oil²²

COMPOUND DRUG

*Majoon Supari Paak*²⁴

CHEMICAL CONSTITUENTS

Various bioactive components reported in *Vigna mungo* were found and it includes flavonoids, isoflavonoids, phytoestrogens, phenolic acids, enzymes, fibers, starches, trypsin inhibitors, phytic acid, lectins, saponins, tocopherols. Black gram seeds contain about 25% protein and 65% carbohydrates^{15,20}. Allantoin, glutathione, plant growth regulators, and lignin precursors are present in seeds¹. Contains genistein, kievitone, dalbergiodin, isoferreirin, eurenol, glycinol, hydrate, arbutin^{11,18,19,34}. Glycosides, tannins, alkaloids, terpenoids, quinone, sterols. All plant parts (seeds, leaves, stems, and roots) possess trypsin inhibitors. Black gram flour contains mucilage that can sustain the release of the freely soluble drug^{2,14,16}

DISCUSSION

Several clinical facts suggest that plant-derived foods hold various potential health benefits, well known as nutraceuticals. These are the products that are used as food or as a part of food, able to cure and prevent diseases in addition to their basic nutritional value. Worldwide, about 70% of plant-based preparations are used as traditional medicines. For underdeveloped and developing countries, it is a need to provide safe, efficient, and cheap medications. In various parts of India, medicinal plants are widely distributed and always have increasing demand due to their medicinal properties². Black gram (*Vigna mungo*) is rich in bioactive components. Most of the reported components are from the seed part of the black gram. Various processes like cooking, soaking, and germination affect bioactive components. Studies have shown the presence of bioactive compounds in other parts of the plant like leaves, pods, roots, stems, etc. which are normally considered as a waste product. Hence there is a need to isolate and characterize novel bioactive components from other parts of the black gram plant¹.

Patel et al., (2015) reported that *Vigna mungo* hydroalcoholic extract (VMHA) improved arthritic condition significantly by reducing pain and inflammation. Improvement in pain behavior could result from the inhibition of prostaglandins by flavonoids present in VMHA and/or maybe through central pathways of analgesia³². **Usman and Barhate**, (2011) suggested that leaves of *Vigna mungo* L. possess anti-inflammatory, analgesic, and ulcerogenic activities mediated through sequential inhibition of the enzymes responsible for prostaglandin synthesis from arachidonic acid¹⁶. **Ahmed et al.**, (2015) reported that methanolic extract of boiled *Vigna mungo* seeds is effective in alleviating pain³⁵. **Ali et al.**, (2014) reported anti-inflammatory and antinociceptive activities of untreated, germinated, and fermented mung bean aqueous extract³⁶. *Vigna mungo* has been reported pharmacologically to possess anti-inflammatory activity³². Anti-inflammatory activity is due to ethanol extracts mainly polyphenols¹⁶. The seeds of nearly all species of *Vigna* have antioxidant properties and are used to treat different diseases like rheumatism, liver diseases, etc.². The proteins, polypeptides, polysaccharides, and polyphenols from the seeds, sprouts, and hulls of mung beans all show potential antioxidant activity^{8,14,35}. *Vigna mungo* has been shown to possess antimicrobial activities¹⁴.

CONCLUSION

Nowadays several traditional medicines are in the international market but the genus *Vigna* with around 150 species, has received little attention. Therefore, it is required to find out the medicinal importance of individual parts of the plant, to manage, prevent and cure diseases. In this review, it is concluded that *Māsh* is a rich source of nutrients and extract of seeds possess anti-inflammatory, analgesic, and antioxidant activity and able to manage and cure different diseases. To fulfill the demand for efficient, safe, and cheap medications, there is a need to understand the taxonomic characters of various medicinal plants. Further experimentations are required to investigate the possible mechanism of action by which these chemical constituents show their action. The traditional uses, phytochemistry, and pharmacology of *V. mungo* presented in this review could be helpful for future studies and research. The plant has good prospects for the discovery of new molecules and pharmacological activities. These results suggest that mash

bean seed may be used in the food industry as functional food and nutraceutical as well as in the cosmetic and pharmaceutical industries.

FUNDING SOURCE

No funding sources

CONFLICT OF INTEREST

The authors report no conflict of interest.

ACKNOWLEDGEMENT

I am greatly indebted to all the authors, whose encouragement, supervision, and support enabled me to compile this work.

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