



## Pharmacological Activity of *Macrotyloma uniflorum*- A Review

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### ABSTRACT

Horse gram is employed traditionally for urinary calculus degeneration, cold cough, asthma and bronchial problems. Horse gram in seed part is dried, extracted with decoction and is employed as a drug. It contains alkaloids, flavonoids, steroids, tannins and glycosides. Due to its big variety of uses it's gone phytotherapeutic agent. It belongs to the Fabaceae and it's mainly cultivated in India. it's used as an antiobesity natural food supplements in India. It also contains various pharmacological principle activities like Ruksha, Kashaya Rasa, Vipaka, Katu, Tikshna Guna and Ushna Veerya Laghu. Major anti-oxidants like natural phenols and flavonoids are found abundantly within the seeds of horse gram which are good source of food in animal feed. *Macrotyloma uniflorum* is very nutritious legumes with ethno-medicinal claims but its potential for human health and diet has not been explored. The aim of this review is to conclude and discuss the knowledge domain on medicinal properties of horse gram and main its ingredients and particularly obesity.

**Keywords:** *Macrotyloma uniflorum*, Phytochemical, Nutrients, Pharmacological activity.

### INTRODUCTION

It is utilized in traditional medicine and its properties are mentioned in Ayurveda drugs. Herbal plants possess different activities like antioxidant, diuretic, antimicrobial, anti-inflammatory, analgesic, antispasmodic properties, litholytic and anti-calcifying activities with none side effects. (Kubo et al., 1984) The cooked liquor of horse gram seeds with spices is employed within the treatment

of cold, streptococcal sore throat, fever. Taxonomical position of *Macrotyloma uniflorum* Lam: Kingdom: Plantae, Family: *Fabaceae*, Genus: *Macrotyloma*, Species: *M.uniflorum* (Bharathi et al., 2015).

### Botanical Description

Climbing herb with slam up to 60 cm. tall with a perennial fibrous rhizome stem annual densely covered with whitish hairs.

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The faucet root produces a branched rootage with smooth, rounded nodules. Nodules containing nitrogen fixing bacteria. horse gram is an erect, sub-erect or trailing, densely hairy annual herb Compound, alternate, Trifoliolate, stipules lanceolate petiole 1-7 cm. long leaflet ovate elliptical apex rounded to acute base rounded lateral leaflets a symmetric hairy to glabrescent on both surfaces. Flower short only 6-12 mm. long. The flower is cream-yellow with purple spot in auxiliary racemes with 2 appendages at base. Flower zygomorphic, bisexual, Fruit may be a linear oblong pod 3-8 cm.x4-8 mm. up curved towards apex acuminate, densely hairy. When young later mar sparsely so margins glabrous smooth or warty dehiscent 5-10 seeds. Seed size ranges 6-8 mm long and 3-4mm broad smooth of which 100 seed weight is recorded 4gm.Seed trapezoidal oblong or somewhat rounded. (Anita, 2013) (Kaundal et al., 2019) (Bharathi et al., 2015).

#### **Phytochemical composition of horsegram**

Horse gram contains proteins, carbohydrates, amino acids, phenolic acids (caffeic acid, 3,4-dihydroxy benzoic acid, p-coumaric acid, vanillic acid, sinapic acid, chlorogenic acid, ferulic acid and syringic acid), lipids, flavonoids (kaempferol, quercetin and myricetin), fatty acids (hexanoic acid and hexadecanoic acid), tannins, phytosterols (stigmasterol and  $\beta$ -sitosterol), saponins, anthocyanidins (cyanidin, petudin, delphinidin and malvidin), and minerals like iron, calcium and molybdenum. (Kaundal et al., 2019) (Bharathi et al., 2015).

#### **Nutrient composition**

Analyses of horse gram flour for crude protein, fat, ash and moisture contents were administered essentially according to the standard method. The carbohydrate content decided because the weight difference using moisture, crude protein, lipid and ash content data. Total dietary fibre (TDF) was determined by rapid enzymatic assay. Resistant starch was isolated and determined by an enzymatic method. (Anita, 2013) (Bharathi et al., 2015).

#### **Antidiabetic effects:**

$\alpha$ -Amylases inhibitors can prevent diabetes mellitus patients having hyperglycemia. The

carbohydrates are digested by pancreatic enzymes namely  $\alpha$ -amylases and other  $\alpha$ -glucosidases. Here the approach is to reduce postprandial hyperglycemia (high blood glucose level) that prevents absorption of carbohydrate in human body.

#### **Antilithiatic activity**

Presence of bioactive antilithiatic agents is responsible for antilithiatic activity. Presence of polyphenols and phytosterols are responsible for antilithiatic activity. The flavonoids such as quercetin, myricetin and kaempferol are present in horsegram which potentiates antilithiasis. They act by preventing calcium oxalate crystals formation. Hence they are widely used. (Kieley et al., 2008).

#### **Antioxidant activity**

The seed decoction of *M. uniflorum* shows highly antioxidant property through generation of free radical scavenging which inhibit oxidation reactions. Horse gram can be strong herbal therapeutic alternative for the protection of the liver as well as prevention and treatment of high fat- induced oxidative stress and inflammation. (Muthu et al., 2013).

#### **Antiobesity activity**

The adults worldwide are becoming overweight and are clinically found to be obese because of changes in lifestyle. Obesity induced by a high fat diet has been considered to be one of the most popular models among researchers due to its ability to enhance the usual pattern of obesity in humans. (Buettner et al., 2007) High fat diet helps in promotion of lipid metabolism, excites intracellular pathway, produce reactive oxygen species (ROS) and promote oxidative stress. The liver plays a major role in metabolism, toxicity and elimination of exogenous and endogenous components. Although an antioxidant enzyme influences the obesity in metabolic of liver. Antioxidant potential of horsegram protects the body against the harmful effects of obesity. (Abdali et al., 2015).

#### **As wound/burn dressing**

Biological wound materials impregnated with antimicrobial substances are more effective in infected wounds/burns. *Macrotyloma*

*uniflorum* possess good antimicrobial property that can minimize local infection/contaminations from wound/burn surroundings. This substance can be used for treatment of local infection or burn of tissue. This material can be used by surgeons in wound healing process. Moreover, it is having good biocompatibility characteristics and it is effective against both gram positive and gram negative bacterial strains.

#### Antiuro lithiatic activity

Urolithiasis is also known as kidney stone or renal stone. It has caused a major impact on public health standard in last two decades. In Indian traditional medicine, horse gram seeds are used for treatment of urinary stones, piles and urinary diseases, act as astringent, tonic, regulate the abnormal menstrual cycle in women. (Ravishankar et al., 2012) Horse gram has diuretic action which helps in flushing out the excessive ions and helping in mechanical expulsion of stone. *M. uniflorum* could inhibit the formation of calcium stones in kidney, correlating with their antioxidant and other protective effects.

#### As proteinase inhibitor

Proteinase inhibitor isolated from horse gram inhibits specifically enzyme trypsin and

chymotrypsin. The presence of disulfide linkages is important in maintaining the proper geometry of proteinases. The disulfide linkage involvement in unfolding of protein by reduction mechanism. Disulfide linkage plays a predominant role in maintaining three dimensional structure of inhibitor. Thus it is involved in both structure and activity of proteinase inhibitor. (Mehta, 1982).

#### Anti-allergic or Anti-anaphylactic Activity

The ethanolic extract by cold maceration process was prepared, and then it was operated on mice and rats for anti-allergic activity using milk-induced leukocytosis, eosinophilia and passive paw anaphylaxis 47. The results revealed that mice treated with ethanolic extract of horse gram at the concentration of 280 mg/kg and 560 mg/kg showed the significant inhibition of milk-induced leukocytosis and eosinophilia. Rats pretreated with ethanolic extract showed substantial protection against degranulation. Furthermore, when the rats were pretreated with horse gram at the dose of 100, 200 and 400 mg/kg, there was the reduction in paw volume after 0.5, 1, 2, 3 and 4 time interval (Giresha et al., 2015).

**Table 1: Different pharmacological activity of horse gram**

Sr. No.	Activity Performed	Method	Response or Finding	Reference
1	Anti-allergic or Anti-anaphylactic Activity	Milk-induced leukocytosis, eosinophilia and passive paw anaphylaxis	Rats pretreated with ethanolic extract showed substantial protection against degranulation.	(Suralkar., 2013)
2	Anti-HIV Activity	Docking was performed by two ligands, i.e., Dolichin A and Dolichin B with the three replication enzymes, i.e. reverse transcriptase, protease and integrase).	The result showed that the protease enzyme has more effective ability to dock with ligands Dolichin A and Dolichin B effectively than reverse transcriptase, protease and integrase	(Auxilia et al., 2013)
3	Larvicidal and Anorectic Activities	The aqueous extract of seeds of horse gram was prepared and used to check the anorectic activity (weight loss) of horse gram on five groups, i.e. LD, MD, HD, 5HT and NC in Albino rats.	The result showed that at low dose group, i.e., (5HT at a dose of 5 mg/kg) treated with horse gram extract had quicker action than the other groups.	(Bhuvaneshwari, 2014)
4	Hepatoprotective Activity	The hepatoprotective effect in five groups of Wister albino rats were checked i.e., Group I: Control (Saline 5 ml/kg), Group II: Paracetamol (2 g/kg), Group III: Standard (Silymarin 50 mg/kg), Group IV: methanolic extract of horse gram seeds MEMUS (200 mg/kg), Group V: MEMUS (400 mg/kg). D-Galctosamine and paracetamol-induced hepatotoxicity in rats, i.e. damage of liver cells.	The methanolic extract of horse gram seeds (MEMUS) showed the significant hepatoprotective effect (95%) in Wister albino rats at the concentration of 400 mg/kg	(Parmar, 2012)
5	Protease Inhibition Activity	The protease inhibitors were purified from horse gram, and the concentration of inhibitor was 0.27 µg/ml to the tryptic enzyme and 0.46 µg/ml to the chymotryptic enzyme.	Proteinase inhibitors play a significant function in controlling proteases	(Mehta, 1982) (Muricken, 2010)
6	Anthelmintic Activity	The ethanolic extract of horse gram seed was used to check the anthelmintic activity against adult Indian earthworm <i>Pheretima posthuma</i> resemblances with the intestinal roundworm parasites in anatomy.	The anthelmintic activity of the seeds of horse gram was found having good effect by comparing with standard piperazine citrate	(Philip et al., 2009)
7	Anticalcifying activity	In-vitro effect of the immature seeds of Dolichos biflorus on crystallisation of calcium phosphate shared significant results.	They concluded that the anticalcifying activity was lost completely by treating with activated charcoal, which was not recovered or eluted by solvent.	(Peshin , 2010)
8	Anti-inflammatory Activity	VRV-PLA2 (Viper arussellii snake venom PLA2) is used as an enzyme for anti-inflammatory activity.	The findings of these results suggested that horse gram supplementation for 21 and 60 days indicated no significant variations inflammatory mediators, i.e., myeloperoxidase, tumor necrosis factor-alpha (TNF-a), nitric oxide synthase, cyclooxygenase, lipoxygenase, monocyte chemoattractant	(Giresha et al., 2015)

			protein-1 (MCP-1), interleukin-1-beta (IL-1b), etc.	
9	Anticholelithiatic Activity	The gall bladder size was increased with the help of LG (Lithogenic diet) and then checked against both the extracts at different concentrations.	The aqueous extract group showed the lowest incidence of CGS (60.21%) and also significant ( $P < 0.01$ ) reduction of gall bladder weight at 300 mg/kg than the methanolic extract, i.e. 60.0%	(Bigoniya et al., 2014)
10	Antimicrobial activity	The effects of different fractions of methanolic effect of the seeds of <i>D. biflorus</i> on some micro organisms were studied by Basak and Ghosh	A few active principles isolated from seed extract with methanol showed significant action against some test organisms.	(Basak et al., 1994)
11	Antiobesity activity	The hot Extract of <i>Dolichos biflorus</i> (Horse gram) on Body Weight in Overweight or Obese Human Volunteer	The <i>Macrotyloma uniflorum</i> exhibited significant antiobesity activity.	(Bhuvaneshwari et al., 2014)

## CONCLUSION

It is concluded that horse gram may be nutritive also as medicinal food crop which has been under cynical abhorrence for ages. The reported phytochemical and pharmacological studies support its traditional uses and should convince be useful for clinical evaluation and development of economic drugs. Now, various researches are conducted to prove the efficacy of horse gram in various health problems and treat the disease. In spite of the reporting of those positive benefits of the plant, most of the horse gram research studies are of small scale in nature. This review concluded on the update of pharmacological activity of horse gram with showed by response and method used in this.

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