

# A Review on Mung Bean (*Vigna Radiata L.*): Extraction of Flavonoid Content from Mung Bean for the Management of Osteoarthritis

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## ABSTRACT: -

Mung bean is also known as “**Vigna Radiata**”, green gram and they are most commonly found and eaten in most Asian countries, especially China and Japan. These nutrition food and herbal medicines have worked wonders. These exhibit medicinal and non-medicinal properties. Protein, fats, polyphenolic compounds, ash content and five types of fatty acids are present such as stearic acid, palmitic acid, linoleic acid, oleic acid and linolenic acid. In the extraction process of mung beans Soxhlet Apparatus is most commonly used for the flavonoid compound extraction. Mung beans are extracted by three types of solvents such as methanol, ethyl acetate and hexane with distilled water. Vitexin and Isovitexin both are identified as polyphenols.

There is evidence that are bioactive compounds contained in mung beans. Mung beans plays role in degenerative diseases. It is a common source of calcium. It is a good source of vitamins such as vitamin B6, K, and folate as well as minerals such as iron, magnesium, phosphorus and potassium. It is serves as a nutrient in the treatment of Osteoarthritis. Osteoarthritis is a degenerative joint disease in which joints break down over time.

**Key words:** - Mung bean, extraction, degenerative disease, osteoarthritis.

## I. INTRODUCTION: -

Osteoarthritis is the maximum not unusual place continual articular sickness with an growing occurrence because of populace ageing and obesity osteoarthritis is characterized via way of means of articular cartilage degenerative and chronic ache, inflicting disability, lack of function, reduced high-satisfactory of lifestyles and monetary burden the world wide occurrence of oa has been expected at approximately 20% thinking about the oa susceptibility is strongly suffering from genetic and environmental threat factors, the evaluation of oa epidemiology in exceptional populations can make contributions to the expertise of the global burden

of the sickness and might additionally shef mild on the underlying mechanisms of the sickness oa has lengthy been taken into consideration via way of means of a modern loss of capability because of exceptional factors, such immoderate frame weight, superior age, surgical joint treatment, repeat joint accidents and genetic predisposition oa is still the maximum and unusual place joint sickness withinside the global and plenty of sufferers stay undiagnosed as a sickness labelled put on and tear the results of oa will in reality keep to upward thrust because the populace a while and as the proportion of the team of workers older than 65 years of age increase oa associated ache is difficult to deal with due to the fact it's far generated thru a mess of each inflammatory and mechanical nociceptive conduits. Developing medical proof counseled that intake of calorie wealthy diets which might be excessive in fats and carbohydrates however low in protein has brought about multiplied prices of metabolic syndromes which includes hyperglycemia, dyslipidemia and inflammation quite a few plant primarily based totally purposeful ingredients had been endorsed through many international fitness organizations, prompting a name for critical adjustments in nutritional styles for you to enhance fitness statuses and save you continual diseases the mung bean is one of the maximum critical fit to be eaten legume plants grown on greater than 6 million international and fed on through maximum families in Asia. Mung bean is extensively cultivated in Asian countries, India and the hotter part of Europe and America with a quick boom cycle round 2-3 months. Mung bean is a wealthy supply of proteins, nutrients, vital amino acids, complicated carbohydrates, nutrients and minerals and it is simple to be digested mung bean is likewise widely known for a huge wide variety of bioactive compounds consisting of protein, phenolic and flavonoid compounds with diverse fitness benefits. Many organic sports of mung bean seed coat extract have been reported a latest have a look at

confirmed that mung bean seed coat water extract exerted anti-inflammatory effects. Traditional extraction techniques for polyphenols, phenolic and flavonoids from plant substances are maceration, hydro distillation agitated solvent extraction and Soxhlet extraction. Flavonoids content of mung bean is extracted by the Soxhlet extraction process using ethanolic solvent. Soxhlet apparatus is very useful for the extraction process. It is a very conventional method for the extraction.

**1. Mung bean: -**

Mung bean is also known as Vignaradiata, green gram, luteous, look duo, Miyashima, and ooru bean. It is belonged to the family Fabaceae, kingdom is plantae. It has been consumed by India and other Asian countries. It is a good sprout for human health. It is reaching source of proteins, calcium, vitamins, essential amino acids, carbohydrates and vitamins. It is very easy to digest. Mung bean contain large number of bioactive compounds including phenolic and flavonoids compounds with large number of various health benefits.

**Table No. 1. Nutritional composition of Mung bean: -**

1.	Protein	23.86g
2.	Carbohydrate	62.62g
3.	Calcium	132mg
4.	Vitamin B6	0.382mg
5.	Total dietary fiber	16.3g
6.	Total sugar	6.60g

**Table No. 2. Taxonomical classification of mung bean**

1.	Kingdom	Plantae
2.	Subkingdom	Tracheobionta
3.	Supper Division	Spermatophyta
4.	Division	Magnoliophyta
5.	Class	Magnoliopsida
6.	Subclass	Rosidae
7.	Order	Fabales
8.	Family	Fabaceae
9.	Genus	Vigna
10.	Species	Vigna Radiata L.
11.	Common Name	Green gram, Indian mung bean, Moong bean.

**1.1 Morphology: -**

Leaves are ovoid or huge ovoid cotyledons die after emergence and ternate laeves. The leaves are 6-12 cm lengthy and 5-10 cm huge. Racemes with yellow flora are borne withinside the axils and pointers of the leaves with 10-25 flora in line with pedicel self pollinated the pods are 5-10 cm lengthy and 0.4-0.6 huge include 12-14 septum separated seeds which may be both cylindrical or round in form and green, yellow, brown or blue in color. Seeds colorations and presence or absence of

a hard layer are used to differentiate distinctive styles of mung bean. Mung bean is local to north jap India-Myanmar areas of Asia. Vigna radiata var. sublobata verdc.is the nearest wild family of the cultivated mung bean, the seed consists of 3 number one areas: the embryo, nutritive tissue and seed coat. The embryo is the younger sporophyte plan. That is whats going to develop into the brand new tree, shrub, vine etc.



**1.2 Therapeutic uses:** - Mung bean have therapeutic activity: -

**1) Anti-inflammatory activity: -**

Inflammation can have various causes, such as:infection, foreign body stimuli and tissue damage, and are associated with nitric oxide and pro- inflammatory cytokines, which arise from activation of the immune system. Mung bean has been shown to be useful in treating various inflammatory responses, as evidenced by its use in folk remedies and cooking, particularly in Asian countries. Clinical evidence of anti-inflammatory activity was obtained by analyzing the effect of ethanolic mung bean extract on lipopolysaccharide-stimulated macrophages. This activity was associated with the presence of polyphenols, vitexin, Isovitexin and gallic acid in the extract. Mung beans have been consumed in traditional medicine to treat heatstroke related to thirst, irritation, and these beneficial health effects of the seeds and sprouts. Mung beans are useful in the inflammatory response.

**2) Antioxidant activity: -**

It has been demonstrated that mung beans' seeds, shoots, and even shells have antioxidant properties. High levels of polyphenols {2} and free radicals are present in methanolic mung bean extract. Two major antioxidant molecules, vitexin and Isovitexin {3}, are responsible for this potent antioxidant activity. At 100 micrograms per millilitre, the significant antioxidant capacity of seed coat methanolic extract has been demonstrated. Additionally, the seeds are used to extract acetone since they contain more total flavonoids and phenolic chemicals than raw seeds do {2}. Green tea and vitamin C {2} were contrasted with mung bean seeds and soup's capacity to scavenge free radicals. Free radicals are

potentially dangerous chemicals that antioxidants aid in neutralizing. Free radicals can interact with biological components and cause damage when present in big concentrations {3}.

**3) Antimicrobial activity: -**

Because they have a broad spectrum of interest without a known side effect, biocides, or phytochemicals with antimicrobial interest, are becoming more and more recognized. Many reviews had been published online showcasing the potential of mung beans as an antimicrobial agent. A nonspecific lipid transfer peptide has been identified as having a broad spectrum of antibacterial and antifungal interest, as it is highly energetic against fungi, including fusarium oxysporum. Sclerotium rolfsii, F. solani, and Pythium aphanidermatum are the bacteria that are next to Staphylococcus aureus. The sprouts' polyphenol extract shown antibacterial properties against Helicobacter pylori, the bacterium that causes gastroduodenal diseases in people {2}.Strong antiviral and preventive properties of mung bean sprouts guard against herpes simplex virus-1 and respiratory syncytial virus; these properties are comparable to those of acyclovir. Additional research has revealed that the proteins found in beans have antifungal and antiviral properties. These properties have been shown to block HIV infection-related transcriptase and glycohydrolases {3}.

**Anticancer activity: -**

Mung bean proteins have been isolated and work against the majority of tumours' host tissues through a variety of underlying mechanisms. By examining anti-most cancers' cytokines, immunological cytokines, mobileular cycle regulatory genes, apoptotic gene expression,

tumour suppressor genes, and the percentage of apoptotic cells, the unusual anti-most cancers and immunomodulatory effects of methanolic extracts of mung bean sprouts have been assessed in cervix adenocarcinoma and hepatocellular carcinoma mobile traces. These findings strongly suggest that mung bean sprouts are an excellent immunomodulatory agent and anti-most malignancies agent, opening up new therapeutic options. Furthermore, studies conducted in vitro have reported that mung beans have antiproliferative effects on a variety of cancer cell lines, including those of the gastrointestinal tract, ovaries, and breast {3}. Even though the proper processes that modify the prevention of the majority of malignancies are well understood. Several studies have demonstrated that mung beans have anticancer effects through unique modes of action {2}.

**4) Antidiabetic activity: -**

It has been found that mung bean sprouts or seeds greatly benefit diabetic patients. Type 2 diabetic mice were fed seeds and an ethanolic extract of sprouts orally, which reduced their blood glucose levels and had an impact on plasma C-peptide, triglycerides, total cholesterol, blood urea nitrogen, and glucagon levels. Moreover, there has been a noticeable improvement in glucose tolerance multiplicity and insulin immunoreactive ranges. The high concentration of inhibitors of starch hydrolyzing enzymes in sprout ethanolic extracts made them particularly effective at regulating high blood sugar levels. This extract's capacity to block has been linked to high phenolic content material, which lowers intestinal absorption of carbs and, in

turn, lowers blood glucose levels{2}.A examine found out that the phenolic compounds and flavonoids of mung bean diminished the formation of reactive oxygen species and confirmed scavenging interest in opposition to unfastened radicals, accordingly modulating hyperglycemia similarly extra mung bean starch containing 32% amylose became taken into consideration in character with diabetes. Chinese language populace additionally said that the intake of beans, veggies and different meals legumes are inversely linked with the threat of type 2 diabetes. Primarily based totally on those outcomes its miles concluded that those sluggish digestibility wealthy amylose and fiber content material decorate insulin sensitivity ensuing in lower the superiority fee of type 2 diabetes {3}.

**II. OSTEOARTHRITIS:-**

Degenerative joint condition called osteoarthritis causes the joint's tissues to deteriorate over time.

It is the most prevalent kind of arthritis and is more prevalent in the elderly.

Osteoarthritis patients typically experience joint discomfort and, for a brief while, stiffness following rest or inactivity{26}.When we use our afflicted joints, our bones scrape against each other since the cartilage lining the joint has deteriorated over time. Osteoarthritis comes in two varieties: primary osteoarthritis and secondary osteoarthritis. Osteoarthritis has numerous symptoms, including knee and joint discomfort stiffness, swelling around joints, hands, neck, lower back, and other.



**2.1 Symptoms of osteoarthritis: -**

Osteoarthritis usually begins slowly at first, usually affecting one or more joints. The following are typical location indicators of osteoarthritis:

- Pain during joint use, which may get better with rest. Some patients may experience worsening of the pain at night when they are in the later stages of the illness. Pain could be intense or mild.

- Stiffness in the joints, usually resolved in less than 30 minutes, especially in the morning or after extended periods of relaxation.
- Joint modifications that may limit joint mobility. swelling in and around the joint, typically following extensive use or hobbies in that region.
- Modifies the potential inside the cap to move the joint. {26}
- As the cartilage wears away (in larger superior phases), the joint becomes less mobile over time and has a grinding sensation when moved.

As your signs and symptoms get worse over time, sports that you may take part in emerge as hard to do, which include stepping up, getting on or off the bathroom or inside and outside of a chair, gripping a pan, or strolling throughout a parking lot.

Pain and different signs and symptoms of osteoarthritis can also additionally lead you to experience tired, have troubles sleeping, and experience depressed. {26}

## 2.2 Treatment of Osteoarthritis: -

There is no official treatment is available for the management of osteoarthritis. But healthy life style and proper diet is the best way to treat osteoarthritis. If we add some highly calcium containing food for the fulfillment of calcium in the human body. Self-care and exercise are also the good way for treatment of osteoarthritis. Transplantation of knee and other bones are the best way of the management of osteoarthritis. Some treatments are: -

- a. Medications: - Medications that can relieve the primarily pain which is caused by osteoarthritis, include: - 1. Acetaminophen 2. Nonsteroidal anti-inflammatory drugs 3. Cymbalta
- b. Therapy: - Therapies can effective in osteoarthritis, include: -1. Physical therapy 2. Occupational therapy 3. Transcutaneous electrical nerve stimulation
- c. Surgical and other procedures: - 1. Cortisone injections 2. Lubrication injections 3. Realigning bones 4. Joint replacement. {27-28}

## III. CONCLUSION: -

Mung bean shows many therapeutic activities like anti-inflammatory, antioxidant, antifungal, antiviral, antidiabetic etc. Mung bean contain polyphenols, phenolic, flavonoids and other contents which is very useful for human beings.

Mung bean shows the activity against the osteoarthritis and shows very helpful effect against other diseases and disorders. Mung bean contain the calcium content which is beneficial for the human beings.

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