

An Analysis of Health Benefits of Bitter Melon

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ABSTRACT

Outside of traditional medicine, herbalists have a long history of usage. Improvements in analysis and quality control, as well as advancements in clinical research, are demonstrating usefulness of herbal medicine in the treatment and prevention of illness. Momordicacharantia (Bitter melon) is a climbing vine whose bitter leaves and green fruits have been used to treat cancer, diabetes, and a variety of infectious illnesses. It's also a potent anti-HIV/AIDS weapon. Roots, according to Ayurveda, are beneficial in treatment of eye problems. Bitter, cooling, digestible, laxative, antipyretic, anthelmintic, appetizer, treats biliousness, blood disorders, anaemia, urinary discharges, asthma, ulcers, bronchitis, and other ailments. Fruit is bitter, carminative, tonic, stomachic, aphrodisiac, anthelmintic, astringent to intestines, and helpful in the treatment of syphilis, rheumatism, spleen problems, and other ailments, according to Unani school of medicine. Bitter melon is well-known for its ability to help people with diabetes. Bitter melon contains a molecule that is chemically similar to insulin and is often referred to as p-insulin. Researchers have discovered that when taken consistently over a length of time, it has the potential to replace insulin in body. It also includes charantin, a steroidal saponin, peptides that are related to peptides, and some alkaloids that successfully regulate blood sugar levels.

Keywords

Bitter melon, Diabetes, Food, Medicine, Momordicacharantia.

1. INTRODUCTION

Bitter melon, a reasonably common food item, was historically utilized by people in tropical areas for a wide range of ailments. Several infections, cancer, leukemia, & diabetes were among the most frequent diseases it was thought to help. In Western world, leaves & fruit have both been used to create teas & beer, as well as season soups. Bitter melon is frequently consumed as a vegetable when it is unripe. It has also been used as a folk medicine for tumours, asthma, skin infections, GI issues, & hypertension. In China, India, Africa, & southern United States, herb has been utilized as a traditional medicine. Herb has been used to treat diabetic symptoms in past. Seeds were studied in China as a possible contraceptive in 1980s. Bitter melon is a morphologically a herbaceous vine with tendrils that crawls along supports. Blooms are yellow & leaves are simple & alternating. On different plants, male & female flowers bloom. Plant's fruit, known as bitter melon, is rectangular in form with a warty surface & is dark green in color. At least three distinct categories of bitter melon components have been found to have blood-sugar-lowering effects that may be beneficial in diabetes

mellitus. Charantin, a steroidal saponin combination, insulin-like peptides, & alkaloids are among them. It's yet unknown which of these three is most successful, or if they all function together. Bitter melon's benefits for diabetics have been proven in certain scientific studies[1].

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1.1 Chemical Composition

Charantin, a non-nitrogenous neutral principle found in Momordicacharantia, is hydrolyzed to produce glucose & a sterol. M. charantia fruit pulp contains soluble pectin but no free pectic acid. Galactouronic acid may also be found in pulp. Glycosides, saponins, alkaloids, reducing sugars, resins, phenolic components, fixed oil, & free acids are all found in M.charantia fruits. There is also evidence of presence of an unnamed alkaloid & 5-hydroxytryptamine. Presence of 5HT has been reported. Ether extract residue of alcoholic concentration from M. charantia leaves has been found to have hypoglycemic action similar to tolbutamide. P-insulin, a pure protein isolated from M. charantia fruits in crystalline form, is also studied [3].

1.2 Pharmacology

In normal & alloxan-diabetic rabbits, oral administration of fresh fruit juice (dosage, 6 cc/kg body wt.) reduced blood sugar levels. Administration of alcoholic extracts of plant to diabetic individuals had no effect on their blood sugar levels. In rats, p-

Insulin, a polypeptide derived from fruits & seeds, reduced & corrected blood sugar levels quickly[4]

1.3 Properties

Bitter melon is a nutritious fruit. It is beneficial to human body's metabolic & physiological functions. It has following characteristics: -

- Bitter melon is made up of a variety of compounds that have hypoglycemic properties, meaning they lower blood sugar levels.
- Bitter melon makes you hungry.
- Bitter melon aids in digestive process as a whole. As a result, it's utilized to treat intestinal issues.
- Bitter melon is emetic, purgative, & anthelmintic. It also has anti-flatulent properties.
- Bitter melon is utilized to aid fat breakdown in body. Its anti-lipolytic effects are well-known.
- Bitter melon has adequate quantities of all important vitamins, including vitamin A, thiamine, riboflavin, & vitamin C, as well as minerals such as iron.
- Bitter melon is astringent & anti-inflammatory. It has a specific effect on bowel movement.

1.4 Medicinal Uses of Momordica Charantia[5]

Bitter melon is high in vitamins & minerals such as thiamine, beta-carotene, foliate, & riboflavin, as well as calcium, iron, phosphorus, manganese, potassium, magnesium, zinc, & dietary fiber. Bitter melon juice increases physical stamina & avoids chronic tiredness when consumed on a regular basis. Bitter melon's beta-carotene content aids in treatment of eye diseases & improves vision.

- Bitter melon relieves dyspepsia & promotes a sluggish digestive tract. However, since it increases acid secretion, it may aggravate an ulcer that already exists.
- Research shows that drinking bitter melon juice regularly may decrease blood sugar levels & keep insulin levels in control. Inclusion of a unique phyto-constituent termed charantin, insulin-like peptides, & alkaloids, all of which work synergistically to enhance glucose tolerance without raising blood insulin levels, is responsible for hypoglycemic (blood sugar decreasing) effect. These chemicals activate AMPK, a protein that controls fuel metabolism & facilitates glucose absorption, both of which are impaired in diabetics. Number of insulin-secreting beta cells in pancreas has been shown to rise when bitter melon is consumed. Bitter melon's effectiveness has been proven in many clinical trials, & various pharmaceutical firms have stepped in to incorporate it in their formulations[6].
- Bitter melon juice strengthens liver, which helps to avoid jaundice. Bitter melon juice may aid in treatment of a hangover by cleansing & feeding liver.
- Researchers believe bitter melon may act as an immunomodulator. In one therapeutic study, there was some indication that bitter melon may enhance immune cell activity in cancer patients. Bitter melon, if proven, may be beneficial to HIV patients. Fever, colds, & flu, malaria, cancer & tumours, excessive cholesterol, & psoriasis are all possible applications.

- *Piles*: A common folk treatment is to combine three teaspoonfuls of bitter melon leaf juice with a glass of buttermilk & consume it on an empty stomach every morning for approximately a month.
- *Cholera*: The fresh juice of bitter melon leaves is also an excellent treatment for cholera & other kinds of diarrheal early stages.

1.5 Benefits of Bitter Melon

- Bitter melon is well-known for its ability to help people with diabetes. Bitter melon contains a molecule that is chemically similar to insulin & is often referred to as p-insulin. Researchers have discovered that when taken consistently over a length of time, it has potential to replace insulin in body. It also includes steroidal saponins known as charantin, peptides that are related to peptides, & alkaloids that successfully regulate blood sugar levels.
- Bitter melon is an excellent digestive aid & aids in stimulation of gastric juice production. It aids in stimulation of liver's production of bile fluids, which are necessary for fat metabolism. It aids in improvement of peristaltic motions, which is beneficial in preventing stomach problems[7].
- Drinking bitter melon juice may also help with constipation. Constipation is most often caused by poor eating habits & poor nutritional practices. Bitter melon not only relieves indigestibility but also aids constipation relief. It enhances peristaltic motions of gastro intestinal tract as well as absorption of nutrients in intestines.

1.6 Diabetes Treatment with Bitter Melon Recipes

- **Bitter Melon Juice**: Wash & cut bitter melon leaves to make bitter melon juice. 2 glasses of water + 6 tablespoons of chopped leaves. In an uncovered saucepan, bring it to a boil for around 15 minutes. Allow to cool before straining. Drink a third of a cup of it three times a day. Above diet has been shown to be extremely successful in treatment of type 2 diabetes, & if followed consistently, will bring your blood sugar levels under control. It's most natural method to get rid of diabetes.
- **Bitter Melon with Egg**: Cut a bitter melon in half lengthwise & scrape away white flesh, leaving just exterior green portions. Finely slice bitter melon now. To get rid of bitterness, pour a lot of salt on them & let them for a while. To get rid of salt, give it a good rinse. To create a dish, fry it with garlic, anchovies, & two eggs. Above meal is very healthy, particularly for diabetics. Bitter melon is a plant that has several health advantages in addition to treating diabetes. Bitter melon is used to help females with their menstrual difficulties. Sores, eczema, leprosy, & big wounds are among conditions for which it is utilized. It's also used to treat high blood pressure, malaria, fevers, & headaches. When taken internally, it may also help adults & children get rid of worms & parasites. It is also effective against a variety of infections, including herpes & HIV. Bitter melon, sometimes known as bitter melon, is most bitter of all vegetables known to man, yet it is also most therapeutic. Though bitter, fruit is consumed as a vegetable & is used to prepare a variety of delectable cuisines, particularly in India.

Bitter gourd is known as karela in India. *Momordica charantia* is its scientific name. Bitter melon is a morphologically a herbaceous vine with tendrils that crawls along supports. Blooms are yellow & leaves are simple & alternating. On different plants, male & female flowers bloom. Bitter melon is plant's fruit, which is rectangular in form with a warty surface & dark green in color. Bitter melon contains a number of compounds, including charantin, insulin-like peptides, & alkaloids. Bitter melon is extensively utilized in treatment of diabetes mellitus due to these components.

1.7 Therapeutic Uses

- Anorexia: Bitter melon stimulates appetite. As a result, it's used to treat anorexia, a condition in which a person is unable to consume recommended quantity of food.
- Blood Impurities: Because of its bitter tonic qualities, bitter gourd is utilized as a blood purifier. It has ability to cure boils & other skin-related blood issues. A cupful of bitter melon juice mixed with a teaspoon of citrus lemon juice must be consumed every day in morning for therapy.
- Diabetes Mellitus: Recently, much has been published on many health benefits of bitter melon in treatment of diabetes. Bitter melon has a number of bitter compounds that are hypoglycemic in effect, as previously mentioned. It also contains at least one molecule that is similar to insulin produced by pancreatic β cells in humans. As a result, bitter melon is quite efficient in treatment of diabetes. Doctors all around globe recommend drinking bitter melon juice first thing in morning or incorporating it into one's regular diet in some way. Bitter melon, when consumed on a regular basis, helps to lower blood sugar levels.
- Diarrhea: For diarrhea, two teaspoons of bitter lemon juice & two teaspoons of spring onion juice are combined together. After that, a squeeze of lemon juice is applied. Patient is given this juice twice a day. This medication is also helpful in treatment of cholera-related diarrhea.
- Hangovers: juice of bitter melon is an effective hangover cure. It also aids in prevention of liver damage caused by excessive alcohol use.
- Piles: In event of piles, patient is given fresh juice of bitter melons, which has shown to be effective. Each morning, three teaspoons of bitter melon leaf juice should be extracted, combined with a glass of buttermilk, & eaten on an empty stomach. If you stick to this regimen for thirty days, your piles will be totally gone. Paste made from piles leaves may also be used externally on hemorrhoids.
- Pyorrhea: Pyorrhea is a condition in which gums bleed. Including bitter melon in one's regular diet or drinking some of its juice on an empty stomach every morning may assist to alleviate this issue.
- Respiratory Issues: Bitter melon leaf paste is used with equal quantities of tulsi leaf paste to treat respiratory issues. This is taken with honey every morning to cure & prevent respiratory issues including asthma, bronchitis, common colds, & pharyngitis.
- Skin Infections: For scabies, ringworm, psoriasis, & other skin infections, drink one cup of bitter melon juice every morning on an empty stomach. A teaspoonful of lime juice

may be added to this drink to make it more powerful. It's also used to prevent leprosy in some of world's most vulnerable areas.

1.8 Side Effects

In research, bitter melon has been well tolerated. Headaches are a possibility for certain individuals. Bitter melon has been shown to lower blood sugar levels. If you use prescription medications to manage your blood sugar levels, proceed with caution. If you have diabetes & are thinking about trying bitter melon, you should talk to your doctor first. Because of an inability to break down a component of bitter melon seeds, those who have been diagnosed with glucose-6-phosphate deficiency (which is most prevalent among people of Mediterranean or Middle Eastern ancestry) may suffer unpleasant effects such as headache, fever, stomach discomfort, or even coma. Bitter melon may make it difficult to conceive.

2. LITERATURE REVIEW

Verma Y et al. discussed Antidiabetic & adaptogenic properties of *Momordica charantia* in which they discussed how *Momordica charantia* (bitter gourd) water extract was tested on alloxan diabetic rats to see whether it has hypoglycemic effects. After three weeks of therapy with an aqueous extract of herb's fruits, a substantial reduction in blood sugar was seen ($p < 0.01$). Aqueous extract of fruit was more successful in diabetes than powder of dried fruit (blood sugar fell 54 percent after 3 weeks of treatment) (fall 25 percent nonsignificant). At conclusion of study, hypoglycaemic effects in diabetic individuals were shown to be very significant ($p < 0.01$), although they were cumulative & progressive, unlike those generated by insulin. Development of cataracts is delayed, diabetes secondary problems are reduced, & neurological & other common symptoms are relieved even before hypoglycemia occurs, indicating adaptogenic characteristics[8].

Cuong D et al. discussed Identification & characterization of phenylpropanoid biosynthetic genes & their accumulation in bitter melon in which they discussed how Phenylpropanoids & flavonoids are members of a broad group of secondary metabolites that have antioxidant activity & protect cells from biotic & abiotic stressors. buildup of phenylpropanoids & flavonoids in bitter melon, on other hand, has received little attention. In bitter melon, we discovered eleven potential phenylpropanoid & flavonoid biosynthesis genes. Majority of genes were found to be strongly expressed in leaves &/or flowers. Most prevalent components in bitter melon were rutin & epicatechin, according to HPLC analyses[9].

Niaz B et al. discussed Bitter melon in which they discussed how Bitter melon has health advantages for a variety of illnesses & may improve one's quality of life. It's a nutrient-dense plant-based meal rich in bioactive components including alkaloids, polypeptides, vitamins, & minerals. It has potential to combat many lifestyle-related diseases, such as cancer recurrence, diabetes mellitus, stomach discomfort, kidney (stone), fever, & scabies, due to presence of bioactive chemicals. Among bioactive moieties, p-insulin is comparable to insulin, which reduces blood glucose levels in diabetic patients when given subcutaneously. It also includes steroidal saponins known as charantin, peptides that function like insulin, & alkaloids that successfully regulate blood sugar levels[10].

3. DISCUSSION

The bitter gourd, *Momordica charantia*, has long been used in Ayurvedic & Chinese medicine to treat diabetes & its consequences. Anti-diabetic, anti-ulcerogenic, anti-mutagenic, antioxidant, anti-tumour, anti-lipolytic, analgesic, abortifacient, anti-viral, hypoglycemia, & immunomodulatory effects of bitter gourd have been investigated. Bitter gourd proteins (- & -monocharin) have an inhibitory impact on HIV virus, according to in vitro research. Bitter melon's medicinal usefulness is ascribed to its strong antioxidant capabilities, which are attributed to phenols, flavonoids, isoflavones, terpenes, anthraquinones, & glucosinolates, all of which have a bitter taste. Bitter gourd is often used in stir-fries, soups, & as a tea because of its bitter taste. In addition to India, Pakistan, Philippines, Panama, & Nepal utilize this bitter vegetable in their cuisine. Bitter gourd may be used to make a variety of high-value goods, including bitter gourd juice, pickles, dried rings, chips, & more. These valuable products are more pleasant than raw fruit, resulting in increased intake of this bitter fruit. Furthermore, bitter gourd processing may be a source of revenue for farmers & women, improving their living conditions.

4. CONCLUSION

The pharmaceutical, cosmetic, agricultural, & food industries all use therapeutic plants. Medicinal plant usage for illness cure has been recorded throughout history by all cultures. Health risks connected with illogical treatment were most likely unknown to man in prehistoric period. With beginning of medical study, it was discovered that plants contain active elements that are responsible for herbs' therapeutic effect. The blood-sugar-lowering effects of bitter melon's steroidal saponins (charantin, insulin-like peptides, & alkaloids) are thought to be result of three active components known as steroidal saponins (charantin, insulin-like peptides, & alkaloids). Bitter melon's fruits & leaves are high in vitamins & minerals including iron, calcium, phosphorus, & vitamin B. However, we don't know how much of food's content can be absorbed by body's digestive system, & some of these chemicals exist in an unabsorbable state. Bitter melon is also an excellent digestive aid & aids in stimulation of gastric juice production. It helps to stimulate liver's production of bile fluids, which are necessary for fat metabolism. It aids in improvement of peristaltic motions, which is beneficial in preventing stomach problems.

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