



## Antidotic Potency of Bitter Gourd (*Momordica charantia* L)

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### Introduction

Traditional remedies are used about more than 75% population from all around the world in crucial health problems [1,2]. In recent years there is an upsurge clinical research has been focused on traditional plants origin. Plants especially vegetables are rich source of multiple vitamins (Niacin, thiamine and Vitamin A, C and E) dietary fibers and some minerals also. These compounds are mainly linked to reduce prevalence of certain diseases like cardio-vascular disease, cancer while some other chronic diseases [3,4]. *Momordica charantia* (MC) is such one vegetable with numerous health regulating properties that belongs to Cucurbitaceae family, commonly known as bitter gourd or bitter melon in English and karela in Urdu. *Momordica* means, “to bite” indicating to the jagged edges of leaf and fruit surface, which appear as bitten. The entire plant, including leaf and fruit, taste bitter. It is widely grown in most part of Asia especially in Pakistan, China, India and south east part of Asia due to its medicinal aspects. They are also grown on small acres in other various parts of the world. Bitter gourds are found in a wide range. Great morphological variation was found in color, fruits and size. Normally the fruit has oblong shape which resembles with small cucumber, young fruits has green color that turn to pale yellow when ripen. But, Indian *charantia* cultivars have large fusiform fruit, while wild, free-living *M. charantia* var. *muricata* develops small and round fruits [5]. Similarly, three various types occur in China; slightly bitter and comparatively long fruits (30 to 60 cm), extremely bitter and small fruits (10 to 20 cm) and strongly bitter and cone shaped fruits (9 to 12 cm) [6].

It is cultivated throughout the world as vegetable as well as for medicinal purpose. In most developing countries plant extracts are commonly used in the treatment of diabetes [7-11] and anti-carcinogenic and hyper cholesterol [12,13]. The phytochemicals (such as triterpenoids, saponin glycoside and *Momordica* anti-HIV protein-MAP 30 protein) in this vegetable could be incorporated into some food stuffs or supplements as nutraceuticals [14,15]. In Turkish folk medicine, mature fruits of bitter gourd used internally for treatment of peptic ulcers and externally for rapid healing of wounds.

In last few decades' hundreds of studies has been conducted on bitter gourd, using modern tools, with antiviral, antidiabetic, antiulcer, antibacterial, antitumor, antileukemic, anthelmintic, antimutagenic, antioxidant, antiulcer, anti-inflammatory, antimycobacterial, hypotriglyceridemic, hypotensive, immunostimulant, and insecticidal properties [16-18]. The main objective of this review to highlight the medicinal importance of bitter gourd.

### Hypoglycemic activity

Plant extracts of bitter gourd traditionally used as vegetable insulin containing antidiabetic hypoglycemic and antioxidative, agents which are beneficial in treatment of diabetes [10,11,19]. A significant increase was found in number of cells in pancreas of streptozotocin induced diabetic rats after 8 weeks of bitter gourd fruit juice treatment [13]. Similarly, in vivo clinical human research, oral digestion of bitter gourd plants shown low toxicity [8].

A number of studies was conducted to show that three basic components of bitter gourd alkaloids, steroidal and saponins, insulin like compounds that provoked hypoglycemic potential benefits for diabetes patients. The effect of these chemical compounds becomes more efficient in fruit parts where they are available in abundance. One of major hypoglycemic compound in bitter gourd fruits are vicine and charantin that are known to provide a key diabetic medical relief [9].

### Antibacterial activity

Experimentally as well as clinically confirmed antimicrobial properties in bitter gourd leaf extracts [20]. Leaves extracts shows a significant result against *Streptomyces griseus*, *Escherichia coli* and *Shigella dysenteriae* which mainly responsible for stomach disorders [21]. An antiprotozoal activity was found from whole plant extracts of bitter gourd in contradiction of *Entamoeba histolytica* bacteria [20].

### Antiviral activity

Chemical compounds having medicinal properties have been isolated from bitter gourd such as c-momorcharin, which inactivates the ribosome function [22,23] and also simultaneously stimulates the production of MAP30 (*Momordica* anti-HIV protein) which suppresses HIV activity (Human Immunodeficiency Virus) [24,25]. Like as alpha and beta-momorcharin, lectin and MAP 30, have been resulted to have in vitro antiviral function in contradiction of Epstein-Barr, herpes, HIV, coxsackievirus B3 and polio viruses.

### Anti-ulcer activity

Remarkably, bitter gourd has documented having anti *H. pylori* property, which beneficially pay to anti-ulcer activity [26]. Dried powdered of bitter gourd fruits in filtered honey showed significant result and dose-dependent anti-ulcerogenic activity against ethanol-induced ulcerogenesis in rats [27].

### Anti-cancer activity

Different work in vivo and in vitro as well was conducted with rough bitter gourd extracts with MAP 30 have resulted anticancer activity against different disease like breast cancer, prostatic cancer, lymphoid leukemia, lymphoma, melanoma, skin tumor, squamous carcinoma of tongue and larynx, [28-30] treatment of cervical cancer with bitter gourd extracts for 45 and 90 days documented a significant reduction in P-glycoprotein level ( $P < 0.05$ ) from the basal value, while no such effect was seen in patients given only chemotherapy [31].

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## Anti-polio virus activity

Intake of fresh bitter gourd or extracts inactivates the ribosome proteins which inhibit polio virus replication by inhibiting protein synthesis I [32].

## Conclusion

For many years, the scientists have confirmed a number of traditional uses of this bitter herb that continue to be a valuable natural cure for a variety of diseases. Concentrated fruit or seed extracts are found in various plants as capsules and tablets which are marketed today. Bitter gourd medicinal preparations are becoming popular and available in the U.S as well as rest of the world. The role of bitter gourd in diabetics reduces the blood glucose in these patients, delaying complications (nephropathy, neuropathy, gastro paresis and cataracts, atherosclerosis) and becomes anti-infective (known as more susceptible to diabetic diseases). Moreover, there are no pharmacological drugs that can control diabetic disorder. Furthermore, it is cheap and readily available in tropical countries. However, the standardization of bitter gourd and its antidiabetic component followed by a controlled clinical trial is required. Most of the above studies were conducted using the raw preparation of bitter gourd and the chemical method was not specified.

However, a small number of studies have shown the biological activity of bitter gourd compounds such as Charantin, MAP 30, momordin, alpha and beta momorcharine. The anti-cancer activity of bitter gourd against a large number of cancer suggests that it carries the compounds that have the potential to inhibit cancer but the studies are required.

Charantia protein (MAP30) has possible in the treatment of HIV and a number of other infections. MAP30 is better when used in combination with existing antiretroviral drug asthma. Both developing countries like India and Africa, where bitter gourd and AIDS are found, can have great hope of suffering and can be defended as nutritional aid.

Studies show that bitter gourd has low and weak uterine stimulating activity; therefore, the use of bitter gourd is not advocated during pregnancy.

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