Antidotic Potency of Bitter Gourd (Momordica charantia L)

M. Yasir Naeem1, Senay Ozgen1, Khazina Amin1 and Zeliha Selamoglu2

1Department of Plant Production and Technologies, Faculty of Agricultural Sciences and Technologies, Nigde Ömer Halisdemir University Campus, Nigde 51240 Turkey
2Department of Medical Biology, Faculty of Medicine, Nigde Ömer Halisdemir University Campus, Nigde 51240 Turkey

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 bitter. The entire plant, including leaf and fruit, taste bitter. Its 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 ripe. 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 use in the treatment of diabetes [7-11] and anti-carcinogenic and hyper cholesterol [12,13]. The phytochemicals (such as triterpenoids, saponin glycoside and carotenoids) 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, antilulcer, antibacterial, antitumor, antileukemik, antimitugenic, antioxidant, antinflamatory, 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 antitoxic 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 showed 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 antitumor 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].

*Corresponding author: Zeliha Selamoglu, Department of Medical Biology, Faculty of Medicine, Nigde Ömer Halisdemir University, Campus, Nigde 51240 Turkey, Tel: +90-388-2253123; Fax: +90-388-2252582; E-mail: zselamoglu@ohu.edu.tr

Received: February 19, 2018; Accepted: February 28, 2018; Published: March 05, 2018

Citation: Naeem MY, Ozgen S, Amin K, Selamoglu Z (2018) Antidotic Potency of Bitter Gourd (*Momordica charantia* L.). J Tradit Med Clin Natur 7: 268. doi: 10.4172/2573-4555.1000268

Copyright: © 2018 Naeem MY, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
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 diabetes 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 and a number of other infections. MAP30 is better when used in combination with existing antiretroviral drug asthma.

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

References

1. Giron LM, Freire V, Alonzo A, Caoceras A (1991) Ethnobotanical survey of the medicinal flora used by the Caribs of Guatemala. J Ethnopharmacol 34: 173-187.
2. Lans C, Brown G (1998) Observations on ethnoveterinary medicines in Trinidad and Tobago. Prev Vet Med 35: 125-142.
3. Quebedeaux B, Eisa HM (1990) Horticulture and human health. Contributions of fruits and vegetables. Hort Science 25: 1473-1532.
4. Wargovich MJ (2000) Anticancer properties of fruits and vegetables. Hort Science 35: 573-575.
5. http://www.globalsciencebooks.info/Online/GSBOnline/images/0712/ MAPSB_1(2)/MAPSB_1(2)224-226o.pdf
6. Yang SL, Walters TW (1992) Ethnobotany and the economic role of the Cucurbitaceae of China. Economic Botany 46: 349-367.
7. Grover JK, Rathii SS, Vats V (2002) Amelioration of experimental diabetic neuropathy and gastropathy in rats following oral administration of plant (Momordica charantia, Eugenia jambolana, Mucuna pruriens and Tinospora cordifolia) extracts. Indian J Exp Biol 40: 273-276.
8. Rathii SS, Grover JK, Vikrant V, Biswas NR (2002) Prevention of experimental diabetic cataract by Indian Ayurvedic plant extracts. Phytother Res 16: 774-777.
9. Yeh GY, Eisenber DM, Kapchut Tj, Phillips RS (2003) Systematic review of herbs and dietary supplements for glycemic control in diabetes. Diabetes Care 26: 1277-1294.
10. Chen Q, Lauren L, Chan L, Li Edmund T (2003) Bitter melon (Momordica charantia) reduces adiposity, lowers serum insulin and normalizes glucose tolerance in rats fed a high fat diet. J Nutr 133: 1088-1093.
11. Vikrant V, Grover JK, Tandon N, Rathii SS, Gupta N (2001) Treatment with extracts of Momordica charantia and Eugenia jambolana prevents hyperglycemia and hyperinsulinemia in fructose fed rats. J Ethnopharmacol 76: 139-143.
12. Ganguly C, De S, Das S (2000) Prevention of carcinogen-induced mouse skin papilloma by whole fruit aqueous extract of Momordica charantia. Eur J Cancer Prev 9: 283-288.
13. Ahmed I, Lakhani MS, Gillett M, John A, Raza H (2001) Hypotriglycemic and hypcholesterolemic effects of anti-diabetic Momordica charantia (karela) fruit extract in streptozocin-induced diabetic rats. Diabetes Res Clin Pract 51: 155-161.
14. Scchitlanoa P, Camellini M, Maietloc M, Modestai PA, Muiesian ML, et al. (2014) Nutraceuticals and dyslipidemia. Beyond the common therapeutics. J Fund Foods 6: 11-32.
15. Nagarani G, Abirami A, Siddhuraju P (2014) Food prospects and nutraceutical attributes of Momordica species: A potential tropical bioresources - A review. Food Science and Human Wellness 3: 117-126.
16. Ng TB, Chan WY, Yeung HW (1992) Proteins with abortifacient, ribosome inactivating, immunomodulatory, antitumor and anti-AIDS activities from Cucurbitaceae plants. Gen Pharmacol 23: 579-590.
17. Ramam A, Lau C (1996) Anti-diabetic properties and phytochemistry of Momordica charantia L. (Cucurbitaceae). Phytomedicine 2: 349-362.
18. Basch E, Gabardi S, Ulbricht C (2003) Bitter melon (Momordica charantia): a review of efficacy and safety. Ann J Health Syst Pharm 65: 356-359.
19. https://pubag.nal.usda.gov/download/42264/PDF
20. Khan MR (1998) Momordica charantia and Allium sativum: broadspectrum antibacterial activity. Korean Journal of Pharmacognosy 29: 155-158.
21. Omoregbe RE, Ikuebe OM, Ihimire IG (1996) Antimicrobial activity of some medicinal plants extracts on Escherichia coli, Salmonella paratyphi and Shigella dysentereiae. Afr J Med Sci Med 35: 237-375.
22. Feng Z, Li W, Yeung HW, Chen S, Wang YP, et al. (1990) Crystals of a-momorcharin: a new ribosome-inactivating protein. J Mol Biol 214: 625-626.
23. Leung KC, Meng ZQ, Ho WK (1997) Antigenic determination fragments of a-momorcharin. Biochimica et Biophysica Acta 1336: 419-424.
24. Lee-Huang S (1990) MAP 30: A new inhibitor of HIV-1 infection and replication. FEBS Letters 272: 12-18.
25. Lee-Huang S, Huang PL, Bourinbaas AS, Chen HC, Kung HF (1995) Inhibition of the integrase of human immuno-deficiency virus (HIV) type 1 by anti-HIV plant proteins MAP30 and GAP31. Proc Natl Acad Sci U S A 92: 8181-8182.
26. Yesilada E, Gurbuz I, Shibata H (1999) Screening of Turkish anti-ulcerogenic folk remedies for anti-Helicoebacter pylori activity. J Ethnopharmacol 66: 289-293.
27. Gurbuz I, Akyuz C, Yesilada E, Sener B (2000) Anti-ulcerogenic effect of Momordica charantia L. fruits on various ulcer models in rats J Ethnopharmacol 77: 7-82.
28. Licastro F, Franceschi C, Barbieri L, Stitpe F (1980) Toxicity of Momordica charantia lectin and inhibitor for human normal and leukaemic lymphocytes. Virochows Arch B Cell Pathol Incl Mol Patho 33: 257-265.
29. Ng TB, Liu WK, Sze SF, Yeung HW (1994) Action of alphamomorcharin, a ribosome inactivating protein, on cultured tumor cell lines. Gen Pharmacol 25: 75-77.
30. Battelli MG, Polito L, Bolognesi A, Lafleur L, Freday Y, et al. (1996) Toxicity of ribosome-inactivating proteins-containing immunotoxins to a human bladder carcinoma cell line. Inter J Cancer 68: 485-490.
31. Pongnikorn S, Fongmoon D, Kasinrerk W, Limtrakul PN (2003) Effect of bitter melon (Momordica charantia Linn) on level and function of natural killer cells in cervical cancer patients with radiotherapy. J Med Assoc Thai 86: 61-68.
32. Foa-Tomasi L, Campadelli-Fiume G, Barbieri L, Stirpe F (1982) Effect of ribosome-inactivating proteins on virus-infected cells. Inhibition of virus multiplication and of protein synthesis. Arch Vir 71: 323-332.