BITTER MELON

A review of its indications, efficacy and safety.

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BACKGROUND AND USES

Most clinicians who utilize botanical medicine likely have some familiarity with Momordica charantia, or bitter melon. But few of us have ever seen this plant because it is cultivated in the tropics, especially China, India, East African, Central and South America and the Caribbean. Bitter melon is a member of the Cucurbitaceae family, and is a perennial climbing elongated fruit that resembles a gourd or cucumber. Some have called it bitter gourd or bitter cucumber. In specialty Asian markets, it may be known as karela.

The role of bitter melon traditionally, has been as a food and medicine. It appears that it is not a food staple, but maybe eaten several times a week when in season. It's historical medicinal use spans a wide array of conditions, with different parts of the plants being used (leaves, dried or fresh fruit, vine, whole plant, fresh juice) depending on the condition. Bitter melon has historically been used to address high blood pressure, diabetes, diarrhea, fevers, skin fungal infections, gastrointestinal cramps, psoriasis, hyperlipidemia, hemorrhoids, glaucoma and infertility. It has also been used as a traditional abortifacient.

ACTIVE CONSTITUENTS

The active constituents of bitter melon are not definitively determined, but we know the plant contains alkaloids, glycoside, peptides, acids, cucurbitins, charantin, cucurbitacins, momordine, momorcharins and proteins.[1] It is thought that the primary constituents responsible for the hypoglycemic properties are charantin, insulin-like peptide, cucurbutanoids, momordicin and oleanolic acids. [2]

These constituents of bitter melon provide pharmacologic effects including a hypoglycemic effect, antiviral and antineoplastic activities, but the most compelling area of research lies in the area of diabetes, especially type 2 diabetes.

RESEARCH REVIEW AND CLINICAL INDICATIONS

Diabetes

The ability of bitter melon to decrease serum glucose levels has been studied in animal studies and in a small number of human studies. Reductions in blood sugar can be seen quickly, as soon as 30 minutes, with the peak effect between 4-12 hours after taking a dose of bitter melon.

A clinical trial that included 9 type 1 diabetics in the treatment group and 10 type 1 and 2 diabetics in the placebo group, found that injections of bitter melon extract, isolated for its crystallized p-insulin, resulted in a statistically significant decrease in blood sugar. The effect was noted 30-60 minutes after subcutaneous injection, a 21.5% drop from baseline glucose, with a peak effect ranging from 4-12 hours, and a 28% drop after 12 hours.[3] This study was not blinded, randomization did not occur and the placebo group had lower average fasting blood glucose at baseline than did the treatment group, all of which weaken the validity of the results.

A small case series study was published in 1981, where nine type 2 diabetics took 50 mL of bitter melon juice after a baseline glucose tolerance test (GTT), another dose after drinking the juice, and again 8-11 weeks later after daily ingestion of 0.23 gm of fried bitter melon.[4] The mean drop in glucose was 6% one hour after the fried fruit intake. There was a mean drop of 12% in the GTT, 1 hour after the bitter melon juice. Mean glycosylated hemoglobin (HbA1c) also dropped by about 8% from baseline after the 8-11 weeks of fried bitter melon. While the methodology of this study is weak, including lack of controls, the results are important in the effect of bitter melon on type 2 diabetics, for both the lowering of glucose and HbA1c.

Type 2 diabetics were also studied in a case series of 18 patients.[5] Each patient was given 100 mL of bitter melon fruit juice 30 minutes before a glucose load and a GTT. Results were compared to each patient's own previous GTT the day before after drinking just water. Improved glucose tolerance was observed in 13 of the 18 patients with a statistically significant improvement in their GTT. While each patient served as their own control, there was no true control or randomization, but yet again, we do see this blood glucose lowering effect of administering bitter melon.

Another uncontrolled trial studied a case series of 12 type 2 diabetics over 3 weeks. Each individual was given one of two preparations: 1) a bitter melon aqueous extract of 100 gm of chopped boiled bitter melon in 200 mL of water until it was reduced to 100 mL--and this was given daily; or 2) 5 gm of dried fruit powder, three times daily. After the 21 days, those in the powder group had a 25% reduction in mean blood sugar levels. In the aqueous extract group, there was a significant, 54% reduction in mean blood sugar levels and HbA1c dropped from 8.37 to 6.95. These were promising results, yet again, not a controlled trial.

Lastly, more recently and more importantly, a randomized, double-blind, placebo-controlled, three month trial was done in type 2 diabetics who were either newly diagnosed or had poor glucose control. A bitter melon extract powder was given two capsules three times per day (dosage per capsule not given), or placebo capsules with 20 individuals in each group. There was a small decrease in HbA1c.

Other potential indications

Several animal studies have shown significant decreases in triglycerides and LDL cholesterol and increases in HDL cholesterol.[6, 7, 8,9, 10]

In vitro antiviral activity has been observed with bitter melon seeds and its inhibitory effects on HIV integrating into host cells.[11] In vitro research has also demonstrated reduced rates of T lymphocyte infections with HIV-1 and reduced viral replication in infected cells.[12, 13]

There have been some reported in vitro antineoplastic effects,[14, 15] and bitter melon may potential the function of natural killer cells.[16, 17]

DOSAGE

It is not entirely clear what is the most appropriate or effective dose of bitter melon. Powdered dried fruit has been a range of 3-15 gm per day. The fresh juice has been 50-100 mL/day and an aqueous decoction of the fruit has ranged from 100-200 mL per day. Standardized extract dosing ranges from 100-200 mg three times daily.

ADVERSE EFFECTS, CAUTIONS, CONTRAINDICATIONS

Bitter melon has a long history of safe and effective use as ahypoglycemic agent in particular, in Asia, Africa and Latin America. However, some wisdom in its use is warranted.

Bitter melon is considered safe as an oral hypoglycemic agent, but blood glucose monitoring should follow. Bitter melon should be avoided in pregnant women, as it may cause a miscarriage, based on historical use and animal data. Bitter melon seeds contain momorcharin and have been shown to have antifertility effects in female mice and spermatogenesis was inhibited in dogs after being fed bitter melon fruit extract for two months. Two case reports in children resulted in hypoglycemic coma after bitter melon tea, and therefore use in children should be avoided at this time.

If one has a known allergy or hypersensitivity to members of the Cucurbitaceae family (gourds and melons), bitter melon may cause similar reactions. Bitter melon seeds should be avoided by those individuals with glucose-6-phosphate dehydrogenase deficiency.

Due to its hypoglycemic effects, bitter melon may have additive effects when taken with other blood glucose-lowering agents. Simple familiar testing and monitoring will assure safe use of bitter melon preparations.

ABOUT THE AUTHOR

Dr. Tori Hudson, Naturopathic Physician, graduated from the National College of Naturopathic Medicine (NCNM) in 1984 and has served the college in several capacities, including: Medical Director, Associate Academic Dean, and Academic Dean. She is currently a clinical professor at NCNM, Southwest College of Naturopathic Medicine and Bastyr University, has been in practice for 27+ years, is the medical director of her clinic, "A Woman's Time" in Portland, Oregon, and director of product research and education for Vitanica.

Dr. Hudson was awarded the 1990 President's award from the American Association of Naturopathic Physicians for her research in women's health, the 1999 prestigious Naturopathic Physician of the Year award, the 2003 NCNM Alumni Pioneer Award and the 2009 Natural Products Association Pioneer Award.

She is a nationally recognized author (book: Women's Encyclopedia of Natural Medicine second edition, McGraw Hill 2008), speaker, educator, researcher, and clinician. Dr. Hudson serves on several editorial boards, advisory panels and as a consultant to the natural products industry.

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