Herbal Medicine & Diabetes

Managing diabetes through plant medicine

By Suzanne Soroczak

A personal journey

When I first decided to get serious about my Type 2 Diabetes Mellitus (T2DM) diagnosis, I started by doing what I know best, conducting searches on Google and medical databases like PubMed for more information. I tried to learn everything and anything related to diabetes and health. I was keenly aware of the ocean of things that I didn't know and I soon became overwhelmed by the sea of data available on the internet. I printed out a lot of different articles, read even more, and generally gravitated to what resonated with me. Over, and again I found myself pulled to learn more about the healing power of plants. I signed up for an 11-week internship with Suzanne Tabert of the Cedar Mountain Herb School and soon found myself walking through the local forests of the pacific northwest learning to identify native plants, understand their healing properties, and making herbal medicine. My experiences at the Cedar Mountain Herb School encouraged me to go deeper and within the year I enrolled in the Therapeutic Herbalism master's program at the Maryland University of Integrative Health. My degree and this chapter are the culmination of my years of study and focus on medicinal plants that support the endocrine and hormone systems of the body and that help the body maintain glucose homeostasis.

Glucose homeostasis is the process by which the levels of blood sugar, primarily glucose, are maintained by the body within a narrow range.

Suzi at Mumm winery in Napa, CA

Introduction to herbal medicine

Humans have been using plants to feed and heal the body since we have been walking upright on two feet. There are several philosophical and epistemic approaches to plant medicine that have been taught and used for millennia including Traditional Chinese Medicine (TCM) and Ayurveda of India. Each approach works with its own catalog of standard herbs and formulations. Similarly, traditional western herbal medicine has been developed over the last several hundred years and it too has its own philosophy and favorite plants. All of these approaches seek to work with and support the body's own proclivity to heal. For those living with a chronic illness like T2DM, plant medicine may provide enough of a push to tip body systems back into balance or homeostasis.

A body's self-healing ability

The body is a miraculous thing and is working 24/7 to stay healthy and to heal itself. I am in awe when I watch my body heal cuts and wounds seemingly like magic! That very healing process takes place inside the body as well. A goal of plant medicine is to help the body do what it is naturally inclined to do. In this chapter, we'll take a look at how the body tries to maintain balance and heal itself of a chronic illness like T2DM.

"When I stand before thee at the day's end, thou shalt see my scars and know that I had my wounds and also my healing." – Rabindranath Tagore

Building a working vocabulary

In order to begin our herbal medicine journey, it is helpful to have a shared vocabulary to talk about these concepts with clarity. This section will introduce some key concepts and their definitions to make communication easier.

Adaptogens balance the body

Adaptogens are a relatively new category of medicinal herb from the last 50 years. They are mild in effect and can exhibit stimulating effects. Adaptogenic herbs can be further divided into primary and secondary adaptogens. Primary adaptogens have their primary effect as stress normalizing. An Introduction to Herbal Medicine (n.d., page 1) by Miles Drake describes how adaptogens work to "help the body adapt to stress and support or restore normal levels of life force or energy; such a plant is often called a 'tonic', and often work by enhancing adrenal gland function."[1]

Adaptogens contain triterpenoid and phenolic constituents, especially phenylpropanoids, which are known for their stress reducing effects. Examples of adaptogens include ginseng (*Panax ginseng*), rhodiola (*Rhodiola rosea*) and schisandra (*Schisandra sinensis*). Some top reasons for using adaptogens in a clinical setting are to promote vitality & disease resistance; reduce stress, depression & anxiety; and support chronic illness & convalescence. Stress increases hormones in the body, such as the "fat" hormone cortisol, which adaptogens help to normalize.

Constituents

Constituents are chemically defined substances or group(s) of substances found in plants and herbal formulations. These are the chemical combinations that are found in and extracted from the plant material. In modern times, these plant constituents are often isolated to prepare pharmaceuticals. 70% of drugs on the market today are isolated from plant material. For example, the salicin in aspirin was discovered from the constituent salicylates found in the bark of a willow tree in 1828.

Contraindications

Contraindications are any reports that a drug or herb should not be used in the case in question. Some herbs may attenuate or alter the effect of prescribed medication, for example: by reducing or increasing effects in the body. You should learn about any contraindications before taking an herbal supplement.

Herbal actions

Actions are "the most common terms associated with the properties of medicinal herbs in order to provide a better understanding of the proper use of the herbs and under what conditions they might be utilized."[2] An example action is anti-inflammatory which controls inflammation, a reaction to injury or infection. Some herbal actions we will be discussing in this chapter include:

adaptogen – works through the endocrine system to modulate the physical, mental, and emotional effects of stress and increase resistance to physiological imbalances and disease by strengthening the immune system
adrenergic – supports the adrenal system
antisaccharin – reduces sugar taste
antidiabetic – prevents or relieves diabetes
bitter – stimulates appetite or digestive function
digestive – promotes or aids the digestion process
hepatic – having to do with the liver
hypercholesterolemia – promotes high cholesterol
hyperinsulinemia – promotes the secretion of insulin
hypoglycemiant – lowers blood sugar

[1] Drake, M. (n.d.) An Introduction of Herbal Medicine. URL Accesses May 28, 2021. https://www.academia.edu/8069449/AN_INTRODUCTION_TO_HERBAL_MEDICINE_Miles
[2] American Botanical Council Terminology https://www.herbalgram.org/resources/terminology-page/

Herbal formats

Herbs can be delivered to the body in a number of different ways. Some of the more common ones are defined below:

capsule – a solid form in which the powdered herb is contained in a small, soluble pill – typically made of gelatin.
infusion / decoction – a drink, remedy, or extract prepared by soaking plant material in liquid. A decoction is the extract resulting from concentrating the essence of a plant through heating or boiling, especially a medicinal preparation made from a plant.
oxymel – a remedy prepared using vinegar and honey (typically). Vinegar in remedies can extend the shelf life by inhibiting bacterial growth.
shrub – a vinegar-based preparation that can be added to water, juice, or alcohol to make a healthy and tasty beverage.
tincture – a liquid extract prepared in alcohol (glycerin may also be used). Tinctures can last several years if prepared properly.

Integrative medicine

Integrative medicine is a term meant to designate a medicinal approach that is open to include many philosophies and practices, including herbal medicine. Chronic illnesses, such as T2DM, may be well served by herbal medicine, where more personalized care and treatment options can be offered.

Layering effect

As food and herbs are ingested they are metabolized by the digestive system in the body. The timing of this is determined by factors including the speed of the digestive system; typically, an herb or drug can be expected to metabolize within 12 hours. In order to keep constituents working around the clock, it is possible to layer the intake of medicine. The simplest way to do this is to take an herbal supplement more than once per day.

Another way to layer the effect is to take one herbal supplement in the morning in one format and extend or increase the effect by adding another component later in the day. In dealing with insomnia for example: drinking lavender tea after dinner to relax and then taking melatonin before bed layers the sedative properties of both supplements.

Long-term use

Some herbs are best suited to short term use for acute issues because they may build up in the body and/or cause other side effects. Other herbs are gentle and may be used daily over a longer period of time. A registered herbalist will be able to tell you whether the herbs you are taking are suitable for long-term use.

Phytochemical

A phytochemical is any biologically active compound found in plants.

Synergy

Synergy is the pharmacodynamic teamwork of many phytochemicals working in concert to improve their effect. An example of this synergy can be found in the antimalarial effects of Wormwood (*Artemisia annua)* which appear to be greater than the chemical compound artemisinin alone. Whole plant synergistic effects are built when plant material from the root, stems, and flowers are used in herbal extract. The production of tinctures that incorporate whole plant material including flowers, berries, and rhizome can be more effective than a tincture created from only one part of the plant. Imagine creating a tincture of Oregon grape flowers picked in the spring, compounding that with a berry tincture prepared in the summer, and adding a final component of the plant rhizome harvested in the fall. The combined product would contain all of the properties developed by the plant throughout the growing season.

To take this concept a step further, different extraction processes can produce different constituents from the same plant. For example, essential oil distillation of Immortelle flowers (*Helichrysum italicum*) produces monoterpenes, sesquiterpenes, monoterpenoids, and phenolic compounds which contain antimicrobial, antiviral, and disinfectant properties.[3] Whereas alcohol extraction processes of Immortelle produce alkaloids, carotenes, flavonoids, and tannins which support antioxidant and anti-inflammatory activities. Using both an essential oil and fluid extract of an herb may allow the herbalist to capture all of these active constituents from both processes, thereby producing a more holistic plant solution. The use of both extracts of Immortelle at the same time would be doubly helpful in treating diabetic wound-healing. The combined effect is a wonderful example of whole plant synergy where synergistic interactions of whole plant or combined crude plant constituents may provide a stronger benefit than single compound extracts alone.

Safety Ratings & Interaction Class

The AHPA has created two scales: a safety rating system for classifying herb safety and the second interaction class for what is currently known about an herb's interactions with prescription or non-prescription drugs. If you decide to try an herbal supplement you can look up the herb rating for more information in the AHPA Botanical Safety Handbook.

Table: AHPA Safety Ratings & Interaction Classes[4]	
Safety Rating	
Class 1	Herbs that can be safely consumed
Class 2a	For external use only
Class 2b	Not to be used during pregnancy
Class 2c	Not to be used while nursing
Class 2d	Other restrictions
Interaction Class	
Class A	No clinically interactions are expected
Class B	Clinically plausible interactions are possible
Class C	Clinically relevant interactions are known

[3] Petersen, D. (2015) Immortelle Essential Oil and Extract: Are Two Preparations Better than One? Journal of the American Herbalists Guild. 13(1): 21-27.

[4] https://www.ahpa.org/AHPAResources/BotanicalSafetyHandbook.aspx

A very traditional approach to health

All traditional approaches to herbal medicine encourage us to take a holistic view of a person's health and to build formulas that strengthen our weaknesses and to generally support our metabolism rather than treating acute concerns.[5] By bringing the body back into balance, acute problems may change or disappear entirely. The great herbal practitioner, Michael Moore, helped develop the western therapeutic approach, whereby herbalists should evaluate and diagnose imbalances of the body's greater systems before treating acute symptoms. Restoring balance in the body may eliminate symptoms altogether."[6] This traditional approach inspired me to study the mechanisms of T2DM, effected organ systems, and to understand its associated metabolic and hormonal imbalances. This section will take a closer look at the traditional approaches of herbal medicine and their philosophy on treating T2DM.

Traditional Western Medicine

In his traditional approach to organ system evaluation, Moore looks for signs of excess or deficiency in the greater organ systems (like the digestive system and central nervous system) of the body. Although Type 1 diabetes is associated with the pancreas, patients with T2DM can experience many symptoms of liver imbalance or deficiency, including unstable blood sugar, low energy, and obesity. It is often a condition acquired later in life and may also be associated with smoking and heavy alcohol intake. In an evaluation, your herbalist may look for signs of excess or deficiency in the liver and the digestive system. According to Moore, herbs used to treat liver deficiencies will also stimulate the other organs that specialize in metabolism, including the pancreas. Two herbs that Moore suggests are Devil's Club (*Oplopanax horridus*) and Goldenseal (*Hydrastis canadensis*). [Due to potential issues with over harvesting, I'm not going to cover these two herbs in this chapter.]

Traditional Chinese Medicine (TCM)

In TCM Xiao-ke (diabetes) is considered a thirsting or wasting syndrome, with excessive heat and drying; effecting the lungs, stomach, and kidneys. The main factors attributed to diabetes were improper diet, emotional disturbances, and a Yin deficiency. [7] However, the recent explosion of T2DM world-wide has caused TCM practitioners to rethink this categorization. A review by researchers recently took a second look at syndrome differentiation under new TCM guidance. They explicitly identify different stages of Xiao-ke and associated symptoms linked directly to the stages of T2DM and the functions of insulin in the body. This differentiation allows the TCM practitioner to select different herbs depending on the stage of T2DM. Schisandra (*Schisandra chinensis)* and ginseng (*Ginseng spp*.) are both herbs that are used in TCM for liver deficiencies and may make good options for you.

Ayurveda

In the ancient Ayurveda medicinal system in India, Prameha syndrome (including T2DM) can be classified as a "sweet urine" disease, which is attributed to an imbalance or excess of Kapha dosha. Doshas are three categories of energy circulating the body (Vata, Pitta, and Kapha). Obesity, often associated with T2DM, can be caused by an imbalance in the Vata dosha. "When people with Vata imbalances overeat to soothe themselves, Kapha can in turn become imbalanced and, over time, contribute to the development of type 2 diabetes."[8] Herbs used to treat both an imbalance of Vata dosha and excess of Kapha dosha include: Gymnema (*Gymnemna sylvestre*), fenugreek seed (*Trigonella foenum-graceum*), cinnamon (*Cinnamomum verum*), and bilberry (*Vaccinium myrtillus*). We will meet these herbs later in the chapter.

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[5] Moore (n.d.) Principles and Practice of Constitutional Physiology for Herbalists. Southwest School of Herbal Medicine. Albuquerque NM.

[6] Moore, M. (1995) Herbal Materia Medica, 5th edition. Southwest School of Botanical Medicine, Albuquerque, NM.

[7] Covington, M. (2001) Traditional Chinese Medicine in the Treatment of Diabetes. Diabetes Spectrum 14:154-158.

[8] Patel (2012) A mind-body approach to diabetes [Blog] Downloaded from https://chopra.com/articles/a-mind-body-approach-to-diabetes, p. 2.

A Traditional Chinese Medicine cabinet

"Heart is benefited by the bitter taste, the Lung by the pungent taste, the Spleen by the sweet taste, the Liver by the sour taste, and the Kidneys by the salty taste. However, this never implies that one may overindulge" – Neijin Suwen in The Yellow Emperor's Classic of Medicine

Eating more bitter herbs

As we begin to learn about herbs and the body, the first place to start is our connection to the plants we eat. Our amazing digestive system was created in conjunction with our deep relationship with plants. There are 5 flavors that the human tongue is built to taste: salty, sweet, sour, bitter, and umami. Umami is that rich, meaty taste that is kind of difficult for Americans to describe. Sweet comes from the fructose or glucose typically found in carbohydrates. Bitter is the most pervasive of the flavors found in healing herbs. Everyone needs some bitters in their diet! Examples of bitter herbs include: dandelion, bitter melon, arugula, chicory, and mustard greens.

Dandelion leaves wrapped in twine

No traditional culture could have imagined a modern diet lacking in bitter foods. Yet bitter herbs are somewhat uncommon to the American palate, which means herbalists have to work harder to make the flavor more palatable for us to ingest. One way of doing that is to introduce a yummy bitter flavor like dark, unsweetened chocolate.

Benefits of bitter herbs

Bitter herbs are long known to promote strong digestion; they work by stimulating digestive secretions like mouth saliva, stomach acids, and digestive hormones.[9] In addition, bitters stimulate our appetites, the breakdown of food for absorption, and promote healthy elimination. The current, typical western diet containing too much sugar and lacking in bitters is causing bitter deficiency syndrome. This syndrome may cause imbalances of hormone regulation in the body and be a contributing factor to the development of hyperlipidemia (high cholesterol) and T2DM in millions of people.

Bitter herbs and T2DM

To our digestive system, sweet taste is a potent stimulant of metabolic hormone secretion and regulation, which signals to our body that it's time to secrete insulin after meals. New research indicates that bitter taste is also very important to the enteroendocrine secretion process.[10] The activation of gut hormones by bitter taste receptors on the tongue keep the entire system in balance. Lack of bitter herbs in our diets may be a factor in T2DM hormonal imbalance.

Working with a registered herbalist

The American Herbalist Guild (AHG), an association of herbal practitioners, offers a registration for practicing herbal clinicians who "demonstrate a core level of knowledge and experience in herbal practice that establishes a meaningful standard of competency for themselves, their communities, and other health professionals and institutions."[11] In the United States there is no governmental licensure to practice herbal medicine, unlike the

[9] Blessed Bitters, Jim McDonald

[10] Chou W. (2021) Therapeutic potential of targeting intestinal bitter taste receptors in diabetes associated with dyslipidemia. Pharmacological Research 170, 105693, ISSN 1043-6618, https://doi.org/10.1016/j.phrs.2021.105693.

[11] https://www.americanherbalistsguild.com/member-profiles

governing bodies required to teach yoga or work as a masseuse. In other countries, like the United Kingdom, herbalists are licensed by a regulatory authority.

If you are interested in working with a registered herbalist, please consult the AHG website to find one located near you. A competent herbalist is one who is able to work with you and your doctor in developing a wellness plan especially for you. Your herbalist should take a detailed health history and inquire about any medication and supplements that you are currently taking. A broad range of knowledge of your physical, mental, and emotional state is important in helping achieve balance in the body. Don't be surprised if your herbalist suggests that you tell your doctor about any herbal medicine that you are taking. You, your doctor, and your herbalist working in concert for your health is integrative medicine at its best.

No matter which philosophical herbal approach calls to you, work with your herbalist to bring balance before drilling down to acute symptoms. If an herbalist instructs you to stop taking your prescribed medication or to stop talking to your doctor, you should find a new herbal clinician.

"Every home should have an herbalist." – Dr. John Christopher

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English daisies in a heart shaped ribbon

Mechanisms of Action in Diabetes

T2DM is a complex disorder that interrupts the balance of several body systems. Doctors prescribe different types of diabetes medication to support specific disrupted functions. There are multiple directions of action to treat diabetes which are targeted by these pharmaceuticals. These same pathways may also be stimulated, inhibited, or modulated by herbal medicine. This section will discuss some of the major mechanisms associated with T2DM and their potential stimulation and attenuation with herbal products.

Increase insulin secretion rate of the pancreas

Insulin, a hormone of glucose homeostasis, is produced by ß-cells(beta cells) in the pancreas. T2DM is associated with a decrease in insulin production and hormone dysregulation. Herbal products can help counter that by increasing the number and size of ß-cells active in the pancreas, thereby increasing the potential for secretion. Stimulating ß-cell function and insulin release are other ways for improving secretion. Bitter herbs have been shown to improve this function, including: ginseng, bitter melon, and gymnema.

Improving insulin sensitivity

Insulin sensitivity is related to how the body senses the amount of insulin in the bloodstream (like a thermometer) and triggers the liver to release more glucose or cells to uptake glucose as needed to maintain homeostasis. Metformin is a common drug that targets this mechanism. Herbs associated with improving insulin sensitivity include: bilberries, fenugreek seeds, ginseng, bitter melon, astragalus (Huang qi), and green tea.

Enhancing glucose uptake in cells

When there is plenty of glucose in the blood (such as after eating a meal), the hormone glucagon signals to muscle and fat cells in the body to pull glucose out of the bloodstream and into the cell. This transfer is managed by a protein called glucose transporter 4 (GLUT4). Impaired transport may be the result of SLC2 gene abnormalities and are also associated with ectopic (abnormal) fat accumulating in the liver. Some herbs that target this process include: cinnamon, green tea, fenugreek seeds, bitter melon, ginseng, and Chinese goldthread (*Coptis chinensis*), among others.

Inhibition of glucose absorption in intestine

In addition to the glucose released into the bloodstream by the liver, the body can absorb glucose during digestion. This can lead to postprandial (after meal) hyperglycemia and is an early stage T2DM symptom. Drugs developed to inhibit glucose absorption can often lead to diarrhea and abdominal pain. Herbal medicine has been associated with fewer overall side effects and can slow down the absorption of glucose in the intestines. Herbs associated with inhibited glucose absorption include: apple cider vinegar, turmeric, bitter melon, mulberries, ginger, green tea, fenugreek seeds, and reishi mushrooms (*Ganoderma lucidum*).

Inhibition of glucose production from hepatocytes

Glucose is produced by hepatocytes (liver cells) and released into the bloodstream as needed. Too much glucose production can be moderated three ways: by regulation of glucogenic enzymes, concentration of glucogenic substrates (glycerol, lactate, and amino acids), and suppression of glucose production itself. Herbs associated with these mechanisms include: ginseng,

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gymnema, bitter melon, fenugreek seed, and Chinese goldthread (*Coptis chinensis*).

Glucogenic means sugar producing.

Inflammation & diabetic complications

Inflammation is a cellular injury marked by capillary dilation, redness, heat, swelling and the loss of function of the tissue. Chronic inflammation may be big factor of major illnesses of the body including cardiovascular disease, autoimmune disorders, metabolic disorders, and diabetic complications. T2DM is a progressive, metabolic disorder with complications like postprandial hyperglycemia, diabetic neuropathy, and retinopathy. There are also comorbidities associated with T2DM such as hyperlipidemia (high cholesterol) and cardiovascular disease. Inflammation is the major mechanism associated with many of these complications and comorbidities. Herbal products that reduce inflammation may have a positive, balancing effect on the body. Herbs that reduce inflammation include: oats, blueberries, cinnamon, ginger, reishi, *Gingko biloba*, and Chinese foxglove (*Rehmania glutinosa*).

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Jars of colorful kitchen spices

Everyday kitchen herbs

Getting started with herbal medicine can be as simple as looking into your spice cabinet! There are many medicinal herbs that are also used regularly in cooking. In this section we will look more deeply at some everyday herbs that can be incorporated into your daily routine that have demonstrated antidiabetic effects. Others are great herb friends that can help us by supporting the body through one of many side effects that T2DM can bring up.

In the next sections we are going to talk about the following everyday herbs:

- *Garlic*
- *Cinnamon*
- *Apple Cider Vinegar*
- *Lavender*

A braid of garlic bulbs

Garlic

Garlic at a glance

Scientific name: *Allium sativum*

Common names: garlic, elephant garlic, purple garlic

Family name: Amaryllidaceae

Part(s) of the plant used: fresh or dried bulb

Native region and environment:

A perennial plant of the Amaryllis family, grown for its flavorful bulbs. Garlic is native to central Asia, but also grows wild in Italy and southern France. It is a classic ingredient in many national cuisines of the region.

History of garlic use

Garlic has been frequently used in remedies in China since 2700 BC. TCM healers place garlic in the Yang category, for its heating and stimulating effects. Garlic was also used in ancient China to treat depression. In Ayurveda, garlic is a valuable remedy used as a tonic to cure a lack of appetite, common weakness, cough, skin disease, rheumatism, and hemorrhoids. Garlic was brought to the Americas by European settlers in the colonial period. During the influenza pandemic of 1917-1918, some Americans believed so strongly in this herb they wore a necklace of garlic when going out in public.

Garlic constituents & diabetes

The potential health benefits of garlic to support a body with T2DM and metabolic syndrome is enormous. Garlic contains a variety of constituents including organosulfur compounds, saponins, phenols, and polysaccharides. At more than 20 phenolic compounds (including: β-resorcylic acid, gallic acid, rutin, and quercetin) garlic has more phytochemicals than many common vegetables! Garlic has been shown to improve both glucose homeostasis and lower high cholesterol, commonly associated with T2DM. The active phytochemicals of garlic that have been attributed to these beneficial effects are mainly volatile sulfur compounds like alliin and allicin. Garlic has also been shown to improve insulin sensitivity. A clinical trial studying the effect of orally administered raw garlic on T2DM patients demonstrated a significant reduction in blood glucose level, lipid metabolism and significant improvement in antioxidant enzymes in diabetic patients.[12] Several studies have also reported increased insulin secretion upon administration of garlic or garlic extracts/preparations.[13] Researchers have speculated that the higher insulin production is a result of the actions of another constituent, allixin.[14] The total amount of saponins in purple garlic is almost 40 times higher than that in white garlic, which could indicate that purple varieties are better for antidiabetic results. Studies also indicate that raw garlic has strong antioxidant properties and has been shown to exhibit anti-inflammatory properties which are so supportive to people with T2DM.

Safety and contraindications

With a safety rating of 1 and interaction class C, garlic is generally a safe herb to take, but has been shown to have some herb-drug interactions. Garlic, especially fresh garlic, is safe to include in your daily meals. It is suitable for long-term use, but may need to be temporarily stopped before a major surgery.

Potential Drug Interactions

Persons taking heparin, clopidogrel, or aspirin, and doses equivalent to two or more grams daily of fresh garlic should be monitored for abnormal bleeding.[15]

Garlic preparation & dosing

Garlic is readily available in fresh heads at grocery stores. If you are interested in working with a tincture or capsule format, I would recommend you buy this product from a specialty store.

Daily Dosage Table: Garlic[16]		
Format	**Dosage**	**Preparation**
Fresh	2 cloves	Fresh, minced cloves
Tincture	1.5-6 mL	1:1 liquid extract
Capsule	500-1000mg	Take with water

[12] Mirunalini, S., Krishnaveni, M., Ambily, V., and Professor, A. (2011). Effects of raw garlic (Allium Sativum) on hyperglycemia in patients with type 2 diabetes mellitus. *Pharmacology Online* 2, 968–974.

[13] Eidi, A., Eidi, M., and Esmaeili, E. (2006). Antidiabetic effect of garlic (Allium sativum L.) in normal and streptozotocin-induced diabetic rats. *Phytomedicine* 13, 624–629. doi: 10.1016/j.phymed.2005.09.010

[14] Islam, M. S., and Choi, H. (2008). Comparative effects of dietary ginger (Zingiber officinale) and garlic (Allium sativum) investigated in a type 2 diabetes model of rats. *J. Med. Food* 11, 152–159. doi: 10.1089/jmf.2007.634

[15] Kiesewetter, H., F. Jung, E. Jung, et al. (1993a.) Effect of garlic on platelet aggregation in patients with increased risk of juvenile ischaemic attack. *Eur. J. Clin. Pharmacol*. 45(4):333-336.

[16] Braun & Cohen (2015) *Herbs & Natural Supplements Vol 2.* , Elsevier, Sydney Australia

Garlic Recipes

Garlic has been used as a food additive for more than a thousand years. It can be eaten raw or roasted. Roasting the garlic changes the composition of its constituents and mellows the taste. If you find garlic too bitter to eat you can try taking a garlic supplement. One of the most famous garlic recipes in American cuisine is James Beard's Chicken with 40 Cloves of Garlic, which he brought from France. A couple more recipes follow below.

Roasted Garlic

INGREDIENTS

1 head of fresh garlic
1 T olive oil
Salt & pepper to taste.

INSTRUCTIONS

1. Trim head of bulb about 1/4" inch.
2. Place on a piece of foil.
3. Drizzle with olive oil and sprinkle with salt & pepper.
4. Wrap up in the foil.
5. Bake in 400F oven for 30-40 minutes.
6. Unwrap when cool to touch.

A head of roasted garlic on foil

Garlic Potato Soup

INGREDIENTS

2 T extra virgin olive oil, divided
2 large heads garlic (12 – 15 cloves each)
1 shallot, peeled and sliced
½ t sea salt, divided, plus more as needed
¼ t chili pepper flakes
Black pepper to taste
4 - 5 cups rich broth (chicken or vegetable)
4 sprigs of fresh thyme and parsley, tied with twine
2 medium russet potatoes, cut into 1-inch cubes

3 bowls of garlic potato soup with cream

Tip: The flavor will develop further after a day in the fridge. The soup reheats beautifully, but does tend to thicken – keep a 1/2 cup of stock (water will work, too) on hand to thin soup if needed.

INSTRUCTIONS

1. Preheat oven to 400F.
2. Trim root end of one head of garlic.
3. Roast 1 head of garlic about 15 minutes.
4. Trim, smash, and peel the remaining head.
5. Sauté smashed garlic, shallot, and chili pepper 2 - 3 minutes in a large saucepan.
6. Pour in 3 cups stock and scrape up any brown bits.
7. Add potatoes, roasted garlic, olive oil, and tied herbs (or bouquet garni), along with a 1/2 teaspoon sea salt to pot.
8. Bring mixture to a boil, and then turn heat down to a bubbling simmer. Cook until potatoes are tender, about 15 minutes.
9. Remove bouquet garni and carefully puree soup using an immersion blender.
10. Add up to 1 - 2 more cups of broth, depending on your preferred texture.
11. Add more sea salt to taste, and lots and lots of black pepper.
12. Serve topped with minced thyme and parsley leaves.

Green leaves of the cinnamon tree

Cinnamon

Cinnamon at a glance

Scientific name: *Cinnamomum verum* J. Presl.

Common names: cinnamon, cinnamon bark, cassia cinnamon.

Family name: Lauraceae

Part(s) of the plant used: dried inner bark

Native region and environment:

The cinnamon tree is a small evergreen tree native to Sri Lanka and the Indian subcontinent. It principally lives in the tropical rainforest. The inner bark is harvested after slow-growing for at least 4 years– when the tree is typically over 18 feet.

Sticks of cinnamon

History of cinnamon use

Cinnamon played a major role in colonial expansion. In 1536, Portugal invaded what was then Ceylon (now Sri Lanka) to monopolize the cinnamon trade. By 1770, the Dutch were cultivating cinnamon and the Dutch East India company dominated the world trade in cinnamon from 1796 to 1833. Most commonly, cinnamon is a spice used to flavor food from savory to sweet. It is an ingredient in many recipes including curry, tea blends, and chewing gum! Cinnamon is popular in Spanish-speaking countries like Mexico (it's known as canela) where it is added to chocolate and also in China where it is one of the ingredients of the 5-spice blend. "Cinnamon, along with other spices and fruit, is used in making mulled wine which is often used as an apéritif to aid digestion."[17]

Cinnamon constituents & diabetes

Cinnamon contains many constituents including essential oils (like coumarin), diterpenes, polysaccharides, and phenolic acids. The polyphenols in cinnamon display insulin increasing and antioxidant activity. Cinnamon's phytochemicals have also been shown to increase insulin sensitivity by improving glucose transport to cells and reducing fasting blood sugar. Cinnamon extract may offer partial protection against insulin resistance and diabetes by rapidly inducing the expression of the anti-inflammatory genes in fat cells.

The consumption of cinnamon supplements used in combination with standard hypoglycemic medications or other lifestyle therapies can improve T2DM. In clinical trials it has been shown to modestly reduce fasting blood sugar especially in patients with a BMI over 27.[18] Results on HbA1c. and other body measures have been more conflicted. *In vitro* (in a petri dish) and *in vivo* (in body) evidences indicate that cinnamon may have benefits in improving insulin sensitivity and glycemic control. It has been suggested that cinnamon's effects on blood glucose can be attributed to one of its active constituents: cinnamaldehyde.

Safety and contraindications

With a safety rating of 2b and interaction class A, cinnamon is generally a safe herb to take, but women should avoid it in large amounts while pregnant. Cinnamon supplements appear to be safe for most people for short-term use. Some people may have allergic reactions to cinnamon. Cassia cinnamon (C. cassia) contains varying amounts of a chemical called coumarin, which might cause or worsen liver disease. In most cases, C. cassia doesn't have enough coumarin to make you sick. However, for some people, such as those with liver disease, taking a large amount of C. cassia might worsen their condition. Grocery stores often carry C. cassia, so you may need to find a specialty retailer for the verum cinnamon (C. verum).

Potential Drug Interactions

Moreover, the long-term consumption of coumarins have been demonstrated to cause hepatoxicity in humans and the European Food Safety Authority confirmed maximum daily intake for coumarins to 0.1 mg/kg. Considering the potential toxicity of coumarins in C. cassia, it can be speculated that C. verum may be safer for clinical application in chronic diseases requiring prolonged treatments, such as T2DM.

Cinnamon preparation & dosing

Whole cinnamon bark is available at most grocery stores, however if you are interested in using it to modulate your blood sugar levels make sure you buy the C. verum. If you are interested in working with a tincture of cinnamon, I would recommend you buy this product from a trusted supplier like Mountain Rose Herbs.

Daily Dosage Table: Cinnamon[19]		
Format	**Dosage**	**Preparation**
Infusion	2-6g	Infuse in 8oz boiling water for 10 min
Tincture	1.5-3.0 mL	1:1 liquid extract

[17] https://www.herbalgram.org/resources/herbalgram/issues/95/table-of-contents/herbalgram-95-herb-profile-cinnamon/

[18] Namazi et al 2019 Complementary Therapies in Medicine 43 (2019) 92–101

[19] Braun & Cohen (2015) Herbs & Natural Supplements Vol 2. , Elsevier, Sydney Australia

Cinnamon Recipes

Cinnamon had the ability to create a synergistic effect with other spices and its aroma enhances the sensation of sweetness making it popular to this day. However, it is also useful for its ability to mask unpleasant flavors and odors in meals and supplements.

Overnight Cinnamon Oatmeal

INGREDIENTS

½ C oats
½ C milk (can substitute coconut milk)
¼ C plain yogurt
1/4 t ground cinnamon
½ C cranberries & walnuts (optional)
1 t stevia sweetener
1 t chia seeds

INSTRUCTIONS

1. Add oats to your container of choice.
2. Mix in milk and yogurt.
3. Add in a layer of cranberries and nuts, if using.
4. Top off with cinnamon, sweetener, and chia seeds.
5. Place in fridge and enjoy in the morning!
6. Let steep for at least 8 hours in a refrigerator.

Bowl of oatmeal

Tip: Best to serve within 24 hours.

Cinnamon Lamb Kebabs

INGREDIENTS
2 T chopped onion
4 large garlic cloves, minced
1 T smoked sweet paprika
1 t cinnamon
½ jalapeño pepper, seeded
2 t dried thyme
1 t dried oregano
1 t whole black peppercorns
½ t cumin
1 dried bay leaf crumbled
2 t kosher salt plus more for seasoning lamb.
2 T white wine vinegar
¼ cup olive oil
1 ½ pounds boneless leg of lamb cubed

INSTRUCTIONS
1. Blend all ingredients except lamb.
2. Season cubes of lamb with salt.
3. Pour marinade over lamb and stir to coat thoroughly.
4. Cover and refrigerate 4+ hours.
5. Soak 10, 8-inch bamboo skewers in water for 30 minutes.
6. Preheat grill to medium-high.
7. Thread marinated lamb cubes onto skewers and brush grill rack with oil.
8. Grill lamb skewers 6-8 minutes, turning once, for medium rare. Serve hot.

Lamb kebabs with sides

Bottles of vinegar

Apple Cider Vinegar

Apple cider vinegar at a glance

Apple cider vinegar(ACV) is the fermented juice from crushed apples, making it rich in probiotics. It contains acetic acid and nutrients such as B vitamins and vitamin C.

Vinegar is a liquid solution and one of the most typical pickling agents with 5%-10% acetic acid and it preserves food by altering water activity or pH level.[20] At a pH level of around 4.6, ACV also inhibits bacteria from growing and provides a preservative effect.

Apple cider vinegar is popularly used in salad dressings and cooking, but it's also been used traditionally as medicine for centuries. Medicinal plants and fruits can be extracted directly into vinegar as it does a great job of extracting calcium and minerals from plants and retaining the flavonoids, ligans, and tannins responsible for the color of berries.

History of ACV use

Over 2500 years ago, Hippocrates (the father of medicine) was said to have used only vinegar and honey in his remedies. ACV has been used as a food preservative for millennia and it is found in foods from kimchi to kraut.

ACV constituents & diabetes

While you may have this remarkable condiment sitting in your cupboard for use in salads, scientists have been researching the effect of vinegar on gut health and diabetes for decades. New evidence-based research has shown that both apple cider vinegar and balsamic vinegar can have positive effects on ß-cell function in the pancreas[21] and lower glucose levels in the blood.[22] The active constituent in ACV is acetic acid which has been shown to "suppress disaccharides activity and to raise glucose-6-phosphate concentrations in skeletal muscle; thus, vinegar

[20] Valshali, Jhandai, P., Jadhav, V. J., & Gupta, R. (2019). Bio-preservation of Foods: A Review. *European Journal of Nutrition & Food Safety*, 11(4), 164-174.

[21] Seok, H., & Cha, B. S. (2012). Response: Balsamic Vinegar Improves High Fat-Induced Beta Cell Dysfunction via Beta Cell ABCA1 *Diabetes & Metabolism Journal* 36(5), 390.

[22] Siddiqui, F.J. et al., (2018) Diabetes Control: is vinegar a promising candidate to help achieve targets? Journal of Evidence-based Medicine 23: 1-12.

may possess physiological effects similar to acarbose or metformin."[23] Large clinical trials have shown that improving insulin sensitivity may be key in delaying and preventing T2DM. ACV might help lower blood sugar levels in people with diabetes by changing how foods are absorbed from the gut. Researchers also indicate that vinegar can significantly improve postprandial insulin sensitivity in insulin-resistant subjects. A review of clinical studies worldwide has demonstrated that vinegar intake for 8 to 12 weeks can produce a small, but significant reduction in HbA1c.[24]

There are a couple of different ways that you can include vinegar in your diet to improve your body's blood sugar control. Consider eating salads with apple cider or balsamic vinegar dressing before meals. Ingesting vinegar before meals can reduce the blood sugar spike some diabetics see when eating. Consuming as little as 2T of a vinegar-based fire cider before bed is another way to reduce high overnight blood glucose. Adding vinegar to your diet as a way of maintaining healthy endocrine function has never been so easy.

Safety and contraindications

With a safety rating of 1 and interaction class A, apple cider vinegar is generally safe to take on a daily basis for long-term use.

Potential Drug Interactions

None reported.

ACV preparation & dosing

There are many makers of apple cider vinegar, but be sure by one that contains the "mother" or the fermented material in the bottle.

Dosage Table: Apple cider vinegar[25]

Format	Daily Dosage	Preparation
Liquid	2 T	ACV with the mother
Capsules	15mg Acetic acid	Taken before meals

[23] Johnson, C.S., Kim, C.M., & Buller, A.J. (2004) Vinegar Improves Insulin Sensitivity to a High-Carbohydrate Meal in Subjects With Insulin Resistance or Type 2 Diabetes. Diabetes Care 27(1).

[24] Siddiqui, F.J. et al., (2018) Diabetes Control: is vinegar a promising candidate to help achieve targets? Journal of Evidence-based Medicine 23: 1-12.

[25] Johnston & Gaas (2006) Vinegar: medicinal uses and antiglycemic effect. *Medscape General Medicine* 8(2):61-72

ACV Recipes

Anti-inflammatory diabetic shrub

Have you tried a shrub?!? A shrub is a vinegar-based drink that can be flavored with any fruits or herbs of your choice. You can enjoy a vinegar shrub mixed with sparkling water or alcohol. It's a great way to make taking your medicine more appetizing!

Homemade bottle of vinegar shrub

INGREDIENTS

- 8oz Bragg's apple cider vinegar
- ½ C blueberries
- 2T *Ginseng spp.* root
- 10 berries *Schisandra chinensis*
- ¼ C Stevia sweetener

INSTRUCTIONS

1. Pour 8oz of ACV with mother into a small pot.
2. Simmer ginseng, bilberries, and schisandra berries in vinegar over a low heat for 30 minutes.
3. Strain and add sweetener while warm.
4. Combine mixture in a tightly sealed jar.
5. Mix 2T of shrub with 8oz of sparkling water to make a cocktail.
6. Store in refrigerator after bottling.

Vinegar & Olive Oil dressing

Eating salad with a vinegar-based dressing is a wonderful way to aid your digestion and increase your body's sensitivity to postprandial insulin.

INGREDIENTS

¼ C Apple cider vinegar
¼ C Olive oil
2 cloves garlic, crushed
¼ t Dijon mustard
1 t Stevia or to taste
Salt & pepper

INSTRUCTIONS

1. Combine minced garlic and olive oil.
2. Blend using an immersion blender.
3. Add rest of ingredients.
4. Puree until smooth.
5. Keeps in a closed jar in the refrigerator.

Olive oil and herbs

Lavender blossoms

Lavender

Lavender at a glance

Scientific name: *Lavandula spp.*

Common names: lavender, English lavender, French lavender, Provence lavender

Family name: Lamiaceae

Part(s) of the plant used: most commonly used parts are the leaves, petals, and flowering tips. Essential oil is also made from the fragrant flowers.

Native region and environment:

Lavender can be found in "dry grassy slopes amongst rocks, in exposed, usually parched, hot rocky situations often on calcareous soils."[26] Its native range is across Europe and the Mediterranean.

[26] Plants for a Future, 2017

History of lavender use

Lavender has a long and storied history of use in both Spain and Morocco. One of the most famous physician-botanists, from Islamic history, Ibn al-Baytar wrote about its use in the early 1200s. Lavender has been used for traumatic injuries, nervous system, mental illness, rheumatism, and cough/cold systems.[27] Lavender was also being used in medieval Europe as one of the ingredients of the 'Four Thieves' Vinegar' to protect against the plague. It was one of the first garden plants brought to the new world by early English settlers. Lavender can be used "to dry up the moisture of a cold braine", where it is "especially good use for all griefes and paines of the head and brain."[28] Pliny the elder, the famous monk, mentioned that *Lavandula stoechas* was used in powdered form for coughs, sciatica, and vertebrae pain. During the Civil War, a simple oil of Lavandula was used for dressing wounds of soldiers. The flowers of *Lavandula stoechas* were used medicinally until about the middle of the eighteenth century when it fell out of use.

Lavender constituents & diabetes

Although it is not typically listed as an antidiabetic or hypoglycemic herb, lavender is a great herb friend for people living with T2DM. Lavender contains phytochemicals such as monoterpene essential oils, tannins, coumarins, and flavonoids which influence the body in a number of ways. According to Dr. Duke's Phytochemical Database there are more than 81 active phytochemicals found in *Lavandula spp*![29] The monoterpenes (linalool, linalyl acetate, and camphor) give us that wonderful lavender scent and are often expressed in aromatherapy. Due to the high level of monoterpene alcohols in the essential oil, caution should be used with direct contact of the essential oil to skin.

There are several *in vitro* and *in vivo* (in diabetic rats) studies which demonstrate antidiabetic effects and moderation of blood sugar levels[30]. Lavender is also wonderful companion herb for its sedative and stress-reduction properties. It can be used as a sleep aide which is incredibly important for those managing their health with diabetes. Finally, lavender can be added to pain relief formulas which may be helpful for people suffering from painful diabetic neuropathy.

Flavonoids found in lavender, like luteolin, have the ability to induce human protective enzyme systems which provide protective effects against many infectious bacterial and viral diseases and degenerative diseases such as cardiovascular diseases, cancers, and other age-related issues. One *in vitro* study concluded that the "oxygen containing monoterpenes" were responsible for disrupting and killing the fungus *Candida* albicans.[31]

Safety and contraindications

With a safety rating of 1 and interaction class A, lavender is generally a safe herb to take—even for children and pregnant women. One hundred and fifty years ago, it was known as "the child's stimulant."[32] The American Herbal Product Association's Botanical Safety Handbook (2nd ed.) lists no contraindications, other precautions, or drug-herb interactions; as also reported in the monograph on lavender oil published by the European Medicines Agency. They both note that there is a risk of allergic reaction through contact dermatitis in rare cases. Because it is considered safe, it is ok for long-term use.

Potential Drug Interactions

None reported.

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[27] El-Gharbaoui ,A., Benítez G., González-Tejero, M.R., Molero-Mesa, J., Merzouki, A. (2017) Comparison of Lamiaceae medicinal uses in eastern Morocco and eastern Andalusia and in Ibn al-Baytar's Compendium of Simple Medicaments (13th century CE). Journal of Ethnopharmacology 202, 208–224.

[28] Rohde, Eleanour Sinclair (1922) Old English herbals, para. 112. Retrieved January 28, 2018 from https://www.gutenberg.org/files/33654/33654-h/33654-h.htm#FNanchor_112_112

[29] https://phytochem.nal.usda.gov/phytochem/search

[30] Sebai H, Selmi S, Rtibi K, Souli A, Gharbi N, Sakly M. Lavender (Lavandula stoechas L.) essential oils attenuate hyperglycemia and protect against oxidative stress in alloxan-induced diabetic rats. Lipids Health Dis. 2013 Dec 28;12:189. doi: 10.1186/1476-511X-12-189. PMID: 24373672; PMCID: PMC3880178.

[31] Di Sotto A, Mazzanti G, Carbone F, Hrelia P, & Maffei F. (2011) Genotoxicity of lavender oil, linalyl acetate, and linalool on human lymphocytes in vitro. Environ Mol Mutagen. 52(1):69-71.doi: 10.1002/em.20587.

[32] Scudder, (1870) Specific medication and specific medicines. Cincinnati, OH: Wilstach, Baldwin& Co. Retrieved on Feb 7, 2017 from https://www.henriettes-herb.com/eclectic/specmed/lavandula.html

Lavender preparation & dosing

Dried lavender flower buds and essential oil are readily available at many local stores. If you are interested in working with a tincture of lavender, I would recommend you buy this product from a trusted supplier like Mountain Rose Herbs.

Daily Dosage Table: Lavender[33]		
Format	**Dosage**	**Preparation**
Infusion	1.5g	Steep dried flowers in 8oz boiling water for 10 minutes
Tincture	2-4mL (40-80 drops)	1:5 (lavender : alcohol) 50% proof
Aromatherapy[34]	0.5–0.2mL (2-4 drops)	Essential oil in carrier oil or water

Lavender Recipes

Bedtime lavender & chamomile tea

1. Combine 1 teaspoon each of lavender and chamomile buds into a tea ball or sachet.
2. Bring 8 ounces of water to boil
3. Steep tea buds for 10 minutes.
4. Remove the tea ball or sachet.
5. Enjoy sweet dreams before bedtime.

Lavender & blueberry ice tea (makes a pitcher)

INGREDIENTS
4 t lavender buds
32 oz water
½ C Stevia sweetener to taste
½ C blueberries

INSTRUCTIONS
1. Add 4 teaspoons of lavender buds to a tea ball or sachet.
2. Bring 8 ounces of water to boil.
3. Pour boiling water into a glass container.
4. Steep lavender tea ball or sachet for 10 minutes.
5. Add Stevia and remaining water.
6. Place glass container in refrigerator to cool for at least 1 hour.
7. Add blueberries to glass container and chill for another 2 hours.
8. Serve in tall glasses with ice.

Large pitcher of ice tea

[33] Braun & Cohen (2015) Herbs & Natural Supplements Vol 2. , Elsevier, Sydney Australia
[34] https://journals.lww.com/hnpjournal/Abstract/2009/01000/Lavandula_Angustifolia_Miller__English_Lavender.9.aspx

Advanced Herbs

70% of the people on this planet use herbal medicine as their main health practice and many of these people are living with T2DM. There are many, very good herbs at supporting a body living with T2DM and its side effects. We're going to go through a few of the most widely used herbs in this section. However, these herbs have hypoglycemic actions which can cause low blood sugar when combined with diabetes medication. You should ask your registered herbalist about the potential effects of these herbs for your particular situation. You should also inform your doctor that you are taking these herbs as they may ask you to monitor your blood sugar level more closely. The following advanced herbs are commonly used to help the body maintain blood glucose homeostasis:

- *Ginseng*
- *Fenugreek seed*
- *Bitter melon*
- *Gymnema*

Dried ginseng root

Ginseng

Ginseng at a glance

Scientific name: *Panax spp*.

Common names: ginseng, American ginseng (*Panax quinquefolius*), Asian ginseng (*Panax ginseng*), Korean ginseng.

Family name: Araliaceae

Part(s) of the plant used: root

Native region and environment:

American ginseng is native to deciduous forests (forests that lose their leaves every year) of the United States from the Midwest to Maine, primarily in the Appalachian and Ozark regions, and also in eastern Canada[35]. Ginseng requires a minimum of 5 years of growth to reach harvest size, which makes sustainability difficult. Today there are cultivated, wild-simulated, farms which grow ginseng in forested areas without fungicides.

[35] https://www.fws.gov/international/plants/american-ginseng.html

History of ginseng use

Asian ginseng is native to the far east, including China and Korea, and has been used for health-related purposes for at least 2,000 years. Asian ginseng is one of several types of ginseng (another is American ginseng). The terms red ginseng and white ginseng refer to Asian ginseng roots prepared in two different ways. In TCM, Asian ginseng was used as a tonic that was believed to replenish energy.

Ginseng constituents & diabetes

Ginseng is a powerhouse diabetes herb, not surprising given its genus name (Panax) comes from the Greek panakeia ("panacea" or "cure-all"). Ginseng is an adaptogen that reduces oxidative stress and contains saponin ginsenosides which have antidiabetic and antiglycemic properties. It has been shown to improve the secretion of insulin by the liver and improve insulin sensitivity of cells. The root of the ginseng plant contains up to a quarter of these ginsenosides (phytochemicals Rg1, Rc, Rd, Rb1, Rb2, Re1, and Rb0).[36] Field cultivated ginseng has been tested and shown to contain higher Rd and Re1 components, while wild harvested ginseng is higher in Rg1. As Re1 ginsenoside has been shown to successfully manage blood sugar level in T2DM, it may be better to take formulations made from ginseng that is field harvested. This has the added benefit of being much cheaper and more sustainable than the wild harvested varieties.

Ginseng is also reported to possess hormone-like and cholesterol-lowering effects, promote vasodilatation, and act as an anxiolytic and antidepressant[37]. Many studies on animals have found ginseng extracts and ginsenosides to be effective in stimulating learning, memory, and physical capabilities[38], providing resistance to infection[39], demonstrating antioxidant and antifatigue effects[40], enhancing energy metabolism, and reducing plasma total cholesterol and triglycerides while elevating HDL levels.[41]

Safety and contraindications

With a safety rating of 1 and interaction class B, ginseng is generally a safe herb to take. Short-term use of ginseng in recommended amounts appears to be safe for most people. However, questions have been raised about its long-term safety and some experts recommend against its use by infants, children, and women who are pregnant or breastfeeding. The most common side effects of ginseng are headaches, sleep problems, and digestive problems. Some evidence suggests that ginseng might affect blood sugar and blood pressure. If you have diabetes or high blood pressure, consult your health care provider before using ginseng.

Potential Drug Interactions

The risk of interactions between ginseng and medications is believed to be low, but there are uncertainties about whether ginseng might interact with certain medications, such as the anticoagulant (blood thinner) Warfarin (also known as coumadin). If you're taking medication, consult your health care provider before using ginseng.

Ginseng preparation & dosing

Dried ginseng root and tinctures are readily available from environmentally responsible sources. If you are interested in working with ginseng root directly, I would recommend you buy this product from a trusted supplier like Mountain Rose Herbs.

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[36] ABC, Ginseng root: Expanded Commission E Monograph

[37] Choi, K. (2008) Botanical characteristics, pharmacological effects and medicinal components of Korean Panax ginseng C A Meyer. *Acta Pharmacol Sin* 2008 Sep; 29 (9): 1109–1118

[38] Petkov, V. D., & Mosharrof, A. H. (1987). Effects of standardized Ginseng extract on learning, memory and physical capabilities. *American Journal of Chinese Medicine, 15*(1-2), 19–29. https://doi.org/10.1142/S0192415X87000047

[39] Singh, V.K. et al. (1984). Immunomodulatory activity of Panax ginseng extract. *Planta Med.*, *50*, 462–465.

[40] Wee JJ, Mee Park K, Chung AS. Biological Activities of Ginseng and Its Application to Human Health. In: Benzie IFF, Wachtel-Galor S, editors. Herbal Medicine: Biomolecular and Clinical Aspects. 2nd edition. Boca Raton (FL): CRC Press/Taylor & Francis; 2011. Chapter 8.

[41] Yamamoto M, Kumagai A, Yamamura Y. Plasma lipid-lowering action of ginseng saponins and mechanism of the action. *Am J Chin Med*. 1983;11(1-4):84-7. doi: 10.1142/S0192415X83000148. PMID: 6660219.

Daily **Dosage Table: Ginseng**[42]		
Format	**Dosage**	**Preparation**
Decoction	3-6grams (0.5-1.5 teaspoons)	Steep dried root in 8oz boiling water for 30 mins
Tincture	2-4mL (40-80 drops)	1:5 (ginseng : alcohol) 50% proof
Capsules	1000mg	Swallow with water

Ginseng Recipes

Ginseng Tea (serves 8)

Nothing is more restorative than ginseng tea when you are feeling low!

INGREDIENTS
1 oz whole dried ginseng root
⅓ oz whole licorice root
⅓ oz fresh ginger root (plus some for garnish)

INSTRUCTIONS
1. Put the ginseng and 8 cups water in a saucepan over medium heat.
2. Bring to a boil, reduce to simmer and simmer for 1 hour.
3. Add the licorice root and ginger root and 2 more cups cold water.
4. Bring the tea to a boil again, reduce heat and simmer for 30 minutes and strain.
5. Serve in 4-ounce cups garnished with an additional slice of peeled ginger root for aroma.

A teacup with tea

[42] Braun & Cohen (2015) Herbs & Natural Supplements Vol 2. , Elsevier, Sydney Australia

Ginseng Chicken Soup (Samgyetang) (serves 2)

Samgyetang is a traditional hot Korean soup consumed surprisingly, during the height of summer! The ginseng and garlic in this recipe make it a perfect pick me up after a long day.

INGREDIENTS

½ cup sweet rice (optional)
2 ginseng roots (fresh or dried)
4 small dried red dates (jujubes), pitted
2 Cornish hens, 1 to 1 1/2 pounds each
1 t coarse salt, more to taste
8 cloves garlic, peeled
4 scallions, white parts sliced, green parts finely chopped

INSTRUCTIONS

1. Rinse off the rice to remove some of the starch.
2. Cover with water and soak overnight with dried ginseng and red jujubes.
3. Drain and rinse ingredients.
4. Remove hen innards and season the bird generously with coarse salt.
5. Add rice(if using), ginseng, and jujubes to the cavity of each bird.
6. Place both hens in a pot with 8 cups of water (enough to cover). Add white part of scallions to pot.
7. Bring to a boil and simmer for 1 hour. Add salt to taste.
8. Sprinkle green scallions on top when serving.

A bowl of ginseng chicken soup

Green fenugreek seed pods

Fenugreek seeds

Fenugreek at a glance

Scientific name: *Trigonella foenum-graceum* L.

Common names: fenugreek, fenugreek seeds, foenugreek

Family name: Fabaceae

Part(s) of the plant used: leaves, seeds

Native region and environment:

Fenugreek (also known as Egyptian hay) is a flowering, fragrant herb from the pea family. The bright green pods produce seeds that are a golden yellow color. Fenugreek is native to the north African Mediterranean and Indian subcontinent. It has been harvested and cultivated in the region for over 6000 years! It is an adaptable dry weather crop that can be grown from sea to the 2000-foot level.

Fenugreek seeds

History of fenugreek use

Fenugreek is one of the oldest known crops in India. The initial references to diabetes (madhumeha) have been found in classical texts of Ayurveda for millennia. In addition, Araee et al. (2009) reported a wide range of medicinal uses, including for the treatment of inflammation, tumors, cardiovascular diseases, renal insufficiency, infections and metabolic disorders. In Ayurveda, the primary symptom in Prameha disorder is polyuria or frequent urination and all types of Prameha are distinguished by the different types of urine. "The etiology matches with modern medicine where sedentary lifestyle, improper dietary habits and genetic factors are described as causative factors."[43] As such, fenugreek has been used to treat diabetes for centuries in India.

Fenugreek constituents & diabetes

Fenugreek is an herb commonly used to treat T2DM on the Indian subcontinent today, both the leaves and seeds. It has been shown to improve a body's ability to maintain glucose homeostasis through several mechanisms. Glucomannan, a mucilaginous fiber, delays sugar absorption in the intestine. Alkaloids in fenugreek seed (fenugrecin and trigonelline) help the body lower the level of sugar in the blood. Amino acids in the herb encourage the liver to release more insulin. It has also been reported that steroidal saponins in fenugreek can improve hypercholesterolemia, a disorder often associated with diabetes. The galactomannan and saponins from fenugreek lower blood glucose, cholesterol, triglyceride and free fatty acids levels and reduce abdominal fat.[44]

Safety and contraindications

With a safety rating of 2b and interaction class A, fenugreek is generally a safe herb to take, but should not be taken while pregnant. It is recommended that other drugs be taken 1 hour **prior** to the consumption of fenugreek. As with any hypoglycemiant, monitory your blood sugar closely while taking this herb.

Potential Drug Interactions

None known.

Fenugreek preparation & dosing

"Fenugreek leaves and seeds are commonly used for flavoring and as a spice in curries due to their strong flavor and aroma".[45]

Daily Dosage Table: Fenugreek seeds[46]		
Format	**Dosage**	**Preparation**
Dried seed	50-100g	Divided throughout day; taken with meals
Tincture	2-6mL	1:2 (fenugreek : alcohol) 40% proof

[43] Ranade M, Mudgalkar N. A simple dietary addition of fenugreek seed leads to the reduction in blood glucose levels: A parallel group, randomized single-blind trial. Ayu 2017;38:24-7.

[44] Basu TK, Srichamroen A (2010) Health benefits of fenugreek in (*Trigonella foenum-graecum* leguminosse) bioactive foods in promoting health: fruits and vegetables, Elsevier, pp 425–35

[45] Peter, K.V. (2012) *Handbook of Herbs and Spices, Vol. 1.*, 2nd Edition. Woodhead Publishing

[46] Braun & Cohen (2015) *Herbs & Natural Supplements* Vol 2. , Elsevier, Sydney Australia

Fenugreek Recipes

Fenugreek water / tea

INGREDIENTS

1 C water
1 t fenugreek seeds, lightly crushed
1 t honey
1 dash nutmeg

INSTRUCTIONS

1. Bring water to a simmer (not boiling).
2. Add fenugreek seeds to water, allow seeds to simmer for 3 minutes.
3. Turn off heat and let seeds steep for 15 minutes.
4. Strain into a cup.
5. Add nutmeg and honey.

InstaPot Indian curry with fenugreek

INGREDIENTS

¾ C split peas
¾ C pink lentils
2 bunches of fenugreek leaves (3 C frozen leaves)
½ t turmeric
1 t grated ginger
2 green chilies
8 cloves garlic
2 t tamarind paste
2 medium tomatoes
1 t vegetable oil
1 t mustard seeds
Salt to taste

INSTRUCTIONS

1. Combine peas, lentils, turmeric, ginger, and green chilies in InstaPot.
2. Bring cooker to pressure and cook for 10 minutes.
3. Heat oil in a small saucepan.
4. Add mustard seed and garlic, sauté until garlic starts to color.
5. Add chopped tomatoes and tamarind paste and sauté for 2 minutes.
6. Add the saucepan contents to the InstaPot content and cook for 5 minutes.
7. Add a bit of water if too thick.
8. Serve over rice.

Fresh fenugreek (methi) leaves

Sliced bitter melon

Bitter Melon

Bitter Melon at a glance

Scientific name: *Momordica Charantia* L.

Common names: bitter melon, bitter gourd, African cucumber, karela

Family name: Cucurbitaceae

Part(s) of the plant used: fruit, leaves

Native region and environment:

Bitter melon is a tropical and subtropical vine of the family Cucurbitaceae, widely grown in Asia, Africa, and the Caribbean for its edible fruit. The fruit has a warty texture similar to cucumber.

History of bitter melon use

Bitter melon has long been used in Asia, Africa, and Latin America as a hypoglycemic herb and serves as a primarily alternative therapy for lowering blood glucose levels in patients with diabetes. The most common application of bitter melon is the use of extracts and powdered formulations. Less frequently used are teas made from the stems and leaves of this cucumber-like fruit. Bitter melon is also consumed as a foodstuff and can be found in many Asian markets.

Bitter melon constituents & diabetes

The main constituents of bitter melon that have reported hypoglycemic actions are the triterpenoids (like charantin) and the ribosome inactivating protein momordin.[47] Several mechanisms of action have been proposed for the hypoglycemic effects of bitter melon, including inhibition of intestinal absorption of glucose,[48] suppression of key glucogenic enzymes,[49] decreasing hepatic gluconeogenesis,[50] and increasing ß -cell production in the pancreas."[51]

Safety and contraindications

With a safety rating of 2b and interaction class C, bitter melon should not be taken during pregnancy. Bitter melon may be safe for medium-term use.

Potential Drug Interactions

Bitter melon has been shown to have a synergistic additive effect on hypoglycemic drugs and should only be taken under supervision of a licensed medical professional.

Bitter melon preparation & dosing

Dosage Table: Bitter melon[52]		
Format	**Daily Dosage**	**Preparation**
Fresh juice	50-100mL	Squeeze out liquid like a lemon
Capsule	500-1000mg	Take with water

[47] Joseph, B., & Jini, D. (2013). Antidiabetic effects of *Momordica charantia* (bitter melon) and its medicinal potency. *Asian Pacific Journal of Tropical Disease*, *3*(2), 93–102. https://doi.org/10.1016/S2222-1808(13)60052-3

[48] Chaturvedi P., George S., Milinganyo M., Tripathi Y. B. Effect of *Momordica charantia* on lipid profile and oral glucose tolerance in diabetic rats. *Phytotherapy Research.* 2004;18(11):954–956. doi: 10.1002/ptr.1589

[49] Shibib, B. A., Khan, L. A., and Rahman, R. (1993). Hypoglycaemic activity of Coccinia indica and Momordica charantia in diabetic rats: depression of the hepatic gluconeogenic enzymes glucose-6-phosphatase and fructose-1,6- bisphosphatase and elevation of both liver and red-cell shunt enzyme glucose-6-phosphate dehydrogenase. *Biochem. J.* 292, 267–270.

[50] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5499308/pdf/fphar-08-00436.pdf

[51] https://www.herbalgram.org/resources/herbclip/issues/bin_242/review43611/

[52] Braun & Cohen (2015) *Herbs & Natural Supplements Vol 2.* , Elsevier, Sydney Australia

Bitter melon recipes

Bitter melon juice [Makes 16 oz]

Juice glass from above

INGREDIENTS
1 bitter melon
2-3 apples
2 celery stalks
1 cucumber
1 lemon

INSTRUCTIONS
1. Wash and prep ingredients for a juice machine.
2. Cut bitter melon lengthways.
3. Put all ingredients through the juicer.
4. Enjoy chilled with ice!

Bitter melon with eggs

INGREDIENTS
2 bitter melons
5 large eggs
½ t salt *(divided)*
1/8 t pepper
½ t sesame oil
3 T vegetable oil *(divided)*
1 t light soy sauce
1 t oyster sauce
½ t monk fruit sweetener

Bitter melon and eggs

INSTRUCTIONS
1. Wash and slice melon in half lengthwise.
2. Use a spoon to scoop out the seeds. Scrape the inside of the melon clean of any white pith, which can be particularly bitter.
3. Turn the melon over so that the hollowed-out side is down on the cutting board, and cut into thin slices.
4. Fill your wok with water, and stir in 1 teaspoon of salt. Bring it to a boil. Blanch the bitter melon for 30 seconds, and drain. Set aside in a bowl.
5. In a medium bowl, beat the eggs with ¼ teaspoon of salt, pepper, and sesame oil.
6. Heat your wok until it is completely dry and just begins to smoke. Add 2 T of vegetable oil.
7. Scramble the eggs quickly so they remain tender and do not brown. When the eggs are 70% cooked, remove them from the wok back to the bowl and set aside in a bowl.
8. Add last T of vegetable oil to the wok, and add the bitter melon.
9. Stir-fry for 15-30 seconds add the light soy sauce, oyster sauce, and sweetener around the perimeter.
10. Add the eggs back to the wok, and mix just until they're cooked through. Remove from the wok immediately and serve.

Gymnema leaves

Gymnema sylvestre

Gymnema at a glance

Scientific name: *Gymnema sylvestre*

Common names: gymnema, gurmar, Australian cow plant

Family name: Aslepiadaeceae

Part(s) of the plant used: leaf

Native region and environment:

A perennial vine native to Asia (including the Arabian Peninsula), Africa, and Australia; gymnema is a slow growing, perennial, woody climber, distributed throughout India, in dry forests up to 600 m height. It is mainly present in the tropical forests of Central and Southern India. It's is a climber with soft hairs on the upper leaf surface.

History of gymnema use

Gymnema has a long history of use in India's Ayurvedic medicine. "It has deep roots in history, being one of the major botanicals used in the Ayurvedic system of medicine to treat conditions ranging from diabetes, malaria, to snakebites."[53] Healers in India and China have used gymnema to treat diabetes for 2,000 years. "The leaves of the plant in particular are used as a digestive, antiviral, diuretic, antiallergic, hypoglycemic, hypolipidemic, and anti-obesity agent for the treatment of diabetes, obesity, and dental caries."[54]

Gymnema constituents & diabetes

Gymnema is known as the sugar destroyer in Hindi, which makes it super helpful for those with T2DM. The leaves contain gymnemic acids, the major bioactive constituents that interact with taste receptors on the tongue to temporarily suppress the taste of sweetness. They also contain saponins and other organic compounds like resins, chlorophyll, and carbohydrates.[55] The gymnemasaponins are likely to be responsible for the hypoglycemic and antisaccharin effect of the plant. Studies have shown that gymnema reduced blood glucose levels in patients with type 1 diabetes orally administered 400 mg of a gymnema extract daily for 10 to 12 months and in patients with type 2 diabetes orally administered 400 mg of a gymnema extract daily for 18 to 20 months."[56]

Safety and contraindications

With a safety rating of 1 and interaction class A, gymnema is generally a safe herb to take. People with diabetes are advised to monitor their blood sugar closely and discuss the use of this herb with a qualified healthcare practitioner prior to use. This herb should be ok for long-term use, but you should monitor your blood sugar level while taking it.

Potential Drug Interactions

None reported.

Gymnema preparation & dosing

Gymnema leaf is chewed on the Indian subcontinent to suppress the taste of sweetness. Try taking gymnema before heading to a party to curb your sweet tooth.

Daily Dosage Table: Gymnena[57]

Format	Dosage	Preparation
Tincture	3mL	Take with meals
Infusion	60g / 0.25Cup	Infuse on 8oz of boiling water for 10 mins

[53] Tiwari, P., Mishra, B. N., & Sangwan, N. S. (2014). Phytochemical and pharmacological properties of Gymnema sylvestre: an important medicinal plant. *BioMed research international*, *2014*, 830285. https://doi.org/10.1155/2014/830285

[54] Leach, M. (2007) Gymnema Sylvestre for Diabetes Mellitus: a systematic review. *The Journal Of Alternative And Complementary Medicine* 13(9) 977–983

[55] Saneja1, A., Sharma, C., Aneja, K.R., & Pahwa, R. (2010) Gymnema Sylvestre (Gurmar): A Review. *Der Pharmacia Lettre* 2 (1) 275-284

[56] Baskaran K, Kizar Ahamath B, Radha Shanmugasundaram K, Shanmugasundaram ER. Antidiabetic effect of a leaf extract from Gymnema sylvestre in non-insulin-dependent diabetes mellitus patients. *J Ethnopharmacol*. 1990 Oct;30(3):295-300.

[57] Braun & Cohen (2015) *Herbs & Natural Supplements Vol 2.* , Elsevier, Sydney Australia

Gymnema recipes

Gymnema tea

INGREDIENTS

¼ C of dried gymnema leaves

INSTRUCTIONS

1. Boil 8oz of water
2. Steep dried gymnema leaves in water for 10 minutes
3. Strain and drink!

Cinnamon Mocha Latte

INGREDIENTS

8-12 oz freshly brewed hot organic coffee
¼ C almond milk
1 t coconut butter
¼ C gymnema powder
1-2 drops vanilla extract
¼ t of cinnamon

INSTRUCTIONS

1. Combine ingredients in a high-speed blender and blend for 30 seconds to one minute, or until frothy.
2. Alternatively, combine ingredients in a wide-mouth jar or coffee thermos and use an immersion blender to combine and froth.

To sum up

This chapter briefly touched on the basics of herbal medicine, including very brief descriptions of traditional schools of thought. Researchers are working every day to discover and isolate new pharmaceuticals from plants and to understand how plant medicine affects the human body. I hope this chapter is an inspiration for you to keep learning new ways to help balance your body with the use of herbs. A body in balance can encourage a natural state of healing and make managing your T2DM more successful. To help you begin your journey, I included some resources on understanding the safety of herbs and lots of references in the footnotes. We dove deeper into the diabetic mechanisms at work in the body and to learn about herbs which can affect those function. The mini-monographs of this short list of T2DM supportive herbs were just the tip of the iceberg, as many more herbs are now being studied for their health benefits.

To learn more, evidence-based papers on the topic can be found on PubMed[58] by searching for "herbal medicine and diabetes". Three recent papers on the topic can be found below:

1. Li GQ, Kam A, Wong KH, Zhou X, Omar EA, Alqahtani A, Li KM, Razmovski-Naumovski V, Chan K. Herbal medicines for the management of diabetes. *Adv Exp Med Biol.* 2012;771:396-413. doi: 10.1007/978-1-4614-5441-0_28. PMID: 23393692.
2. Pang GM, Li FX, Yan Y, Zhang Y, Kong LL, Zhu P, Wang KF, Zhang F, Liu B, Lu C. Herbal medicine in the treatment of patients with type 2 diabetes mellitus. *Chin Med J (Engl).* 2019 Jan 5;132(1):78-85. doi: 10.1097/CM9.0000000000000006. PMID: 30628962; PMCID: PMC6629308.
3. Choudhury, H., Pandey, M., Hua, C. K., Mun, C. S., Jing, J. K., Kong, L., ... & Kesharwani, P. (2018). An update on natural compounds in the remedy of diabetes mellitus: A systematic review. *Journal of traditional and complementary medicine*, 8(3), 361-376.

[58] https://pubmed.ncbi.nlm.nih.gov/