

# Dietary and Botanical Supplement Therapy in Diabetes

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## KEYWORDS:

Diabetes,  
Dietary supplements,  
Botanical supplement  
Herbs

**Context:** As diabetes epidemic is gaining momentum in the society, the use of complementary and alternative medicine (CAM) either in conjunction or as an alternative to conventional medicines is now common and popular. The use of CAM supplement is commonly ignored by physicians and patients with a belief that supplements are natural and not medicine. Thus, the spectrum of polypharmacy mandates clinician expertise to become well informed about the common CAM supplements used in treating diabetes.

**Evidence Acquisition:** An extensive literature search of clinical trials, systematic reviews, and narrative reviews was completed in PubMed from years 1970 to 2013. The keywords for this search included diabetes, complementary and alternative medicine, botanical supplements, and herbal medicine.

**Evidence Synthesis:** Modern societies are experiencing unprecedented levels of chronic and preventable diseases. Western medications often treat the symptoms or the effects of a disease but do little to prevent them. This issue in general has diverted people's attention again towards dietary supplements and herbal medicine over the past few years. Therefore, the use of medicinal foods, nutritional supplements are becoming more common to prevent disease and related complications. Since there is no documentation of adverse effects, the potential for herb- drug or herb-dietary supplement interaction is a big challenge due to the multiple prescription medicines consumed by the diabetic patients. However, even though CAM therapies have been shown to have impact on the glycemic control, the risk associated with the drug use is still a concern.

**Conclusion:** The purpose of this clinical review is to bring awareness among health care providers about selected dietary and botanical supplements frequently used by the patients with diabetes and to provide a framework to advice patients on CAM use.

## INTRODUCTION:

Diabetes mellitus (DM) is one of the most common non-communicable metabolic diseases (NCDs) and most challenging health problems globally.

Complementary and alternative medicine (CAM) had been abundantly consumed for centuries in Asian countries for many conditions but is becoming popular now in westernized nations. In the developed world, population-based studies report that one-half to two-thirds of adults use CAM.<sup>1</sup>

CAM is also largely embraced by osteopathic physicians in training. In a study by Kanadiya and Shubrook<sup>2</sup> 83% of DO students self-reported using at least one CAM modality. The most commonly used alternative medicines included yoga, medication, massage and spirituality/prayer.

CAM is attractive to many people for treatment of chronic diseases such as diabetes. Good glucose control can, however, be difficult for many people with diabetes, because it requires significant changes in behavior and lifestyle. Furthermore, there are many old and new prescription drugs to treat diabetes. The older ones have warnings like renal failure, weight gain, and congestive heart failure. On the other hand, the newer ones are very expensive such as DPP-4, Glucagon like peptide (GLP-1) and come with many health warnings like pancreatitis or different type of cancers. CAM is seen as more "natural" or "safer" than current prescription medications. This feeling has been amplified by consumer marketing of medication in which people will hear of all of the potential side effects of medications during a television commercial. However, CAM treatments which are not regulated by the Food and Drug Association (FDA) are not subject to this public reporting and scrutiny.

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Despite the widespread use and acceptance of CAM, there is limited data to support the use of many of the modalities. In the US, research for botanicals is mainly focused on animal studies and in vitro studies. There is less human evidence due to limited financial support and inability to patent herbal medicines.

## DEFINITIONS

According to the National Centre for Complementary and Alternative Medicine (NCCAM) in the USA, most widely used functional definition of CAM states that ‘CAM is a group of diverse medical and healthcare systems, practices and products that are not presently considered to be the part of orthodox medicine.’<sup>3</sup>

Complementary medicine is often used in conjunction with conventional medicine and alternative medicine is used as a substitute to conventional medicine. The Duke Center of Integrative Medicine named the combination of conventional medicine with alternative medicine as integrative medicine.<sup>4</sup>

**Figure 1: Duke Model of Integrative Medicine**



CAM modalities such as herbal and vitamins and mind-body medicine are most commonly used for the treatment of diabetes. Other classifications of CAM include medical treatments such as homeopathy, Ayurveda (commonly practiced in Asian and Latino countries), manipulation and body-based practices such as chiropractic care, and energy medicine.

**Table 1: Classification of CAM (adapted from The NCCAM)**

|  |   |
|--|---|
| 1. Alternative medical systems:        | Comprises complete systems of theory and practice such as homeopathic and traditional Chinese medicine (TCM).   |
| 2. Mind–body interventions:            | These interventions include a variety of techniques designed to enhance the mind's ability, such as meditation, prayer and art therapies.   |
| 3. Biologically based therapies        | These are botanical supplements found in nature, such as dietary supplements, herbal products and botanical products.   |
| 4. Manipulative and body-based methods | These are based on the movement of one or more body parts, such as chiropractic, osteopathic and massage.   |
| 5. Energy therapies                    | These involve the use of energy fields that are believed to surround and penetrate the human body, such as bio field therapies (Gi Gong and Therapeutic Touch); and bio electromagnetic-based therapies (pulse fields and magnetic fields). |

## CAM REGULATION AND SAFETY

As per Dietary Supplement Health and Education Act (DHSEA) published in 2004, the dietary supplements are considered as food. DHSEA defines a dietary supplement as a “product taken by mouth that contains a dietary ingredient intended to supplement the diet.” These dietary ingredients may consist of “vitamins, minerals, herbs, amino acids, and other botanicals and substances such as enzymes, organ tissues, glandular, and metabolites.”<sup>5</sup>

Dietary supplements are available in different forms including: tablets, capsules, soft gels, liquids, powders, teas/infusions, tinctures (herb soaked in alcohol, glycerin or an alcohol-water combination) and an extract (a filtered or distilled tincture), and topical emollients. People chose one or the other depending on their convenience.

Supplements are not required to the same Food and Drug Administration (FDA) regulatory standards as prescription medications. For example, supplement manufacturers are not required to obtain FDA approval to market their products. Manufacturers are responsible for determining if their products are safe since they are considered a food. The FDA cannot remove a supplement from the market unless it is proven that the supplement is unsafe. This burden of proof of safety is distinctly different than prescription medications. However, dietary supplements are not required to be standardized in the United States. In fact, no legal or regulatory definition exists in the United States for standardization as it applies to dietary supplements.<sup>6</sup>

In this review the authors will discuss commonly used supplements in the care of diabetes. Physicians should know about these supplements as they are frequently used by the patients and have the potential to interact with prescription medications. The authors will also review the available evidence for some of these treatments as some of these products have gone through clinical trials and many of the botanical supplements which are plant based have no research available.

**Table 2: Common dietary supplements used to treat diabetes**

| Dietary supplement | Mechanism of action  | Side effects   |
|--------------------|--|--|
| Alpha lipoic acid  | <ul style="list-style-type: none"> <li>Increases insulin sensitivity</li> <li>Can cross blood brain barrier and prevents Neuropathic pain</li> </ul> | Monitor thyroid function in patients with thyroid disease.   |
| Chromium           | Increases insulin sensitivity  | <ul style="list-style-type: none"> <li>Hypoglycemia when used with other hypoglycemic drugs or insulin</li> <li>Extreme cases can cause renal toxicity</li> <li>Interacts with common drugs like antacids, PPI inhibitors, beta blockers Steroid and NSAIDS</li> </ul> |
| Magnesium          | Increases insulin sensitivity  | Diarrhea, abdominal pain, can cause toxicity in CKD  |

### Chromium

Chromium is an essential trace mineral required for normal carbohydrate and lipid metabolism.<sup>7</sup> It is available in two forms: trivalent (Cr III) and hexavalent form (Cr VI). The trivalent form is commonly found in food and supplements but the hexavalent form is toxic and found in industrial pollution. Chromium picolinate is a commonly used supplement and it is a combination of Cr III and picolinic acid. The trivalent form is also found in food such as broccoli, grapefruit, red wine, dried garlic. Trivalent chromium is an insulin secretagogue which acts by decreasing tyrosine phosphatase activity and has direct effect on insulin receptor by increasing tyrosine kinase activity at the receptor. In addition, chromium enhances insulin binding, insulin receptor number, insulin internalization, and  $\beta$ -cell sensitivity which indicates that it is a powerful hypoglycemic agent.<sup>8</sup>

In some studies chromium supplementation has played a vital role in improving glucose and insulin metabolism in patients with corticosteroid induced diabetes and gestational diabetes.<sup>9, 10</sup>

*Potential side effects:* The most commonly seen side effect from chromium is hypoglycemia especially when taken along with oral hypoglycemic agents. Reducing these medications or insulin by as much as 50% will help to reduce this risk. More frequent blood sugar monitoring is advised when starting chromium in this population. There are other potential drug interactions that include: antacids, H2 blockers, proton pump inhibitors,  $\beta$ -blockers, corticosteroids, nonsteroidal anti-inflammatory drugs, and nicotinic acid. Since these drugs may increase circulating chromium levels it is better to avoid taking both of them together to avoid chromium toxicity. Although rare, overdose of chromium may cause renal and liver failure, thrombocytopenia, hemolysis, skin reactions, and mood disturbances. Patients with abnormal kidney function or liver failure should avoid taking chromium. However there is no evidence based literature reported so far about the adverse effects related to chromium.<sup>11</sup>

*Recommended dosage:* The current recommended dose of CrP is typically 200-1000  $\mu\text{g/day}$  orally in divided doses.

### Alpha Lipoic Acid

This supplement is an antioxidant that is found in every cell and produced by the body itself. Alpha lipoic acid (ALA) helps turn glucose into energy. Pharmacologically, ALA improves glycemic control by increasing insulin sensitivity and may help polyneuropathies associated with diabetes mellitus. ALA also effectively alleviates toxicities associated with heavy metal poisoning. As an antioxidant, ALA directly terminates free radicals, chelates transition metal ions, increases cytosolic glutathione and vitamin C levels, and prevents toxicities associated with their loss.<sup>12</sup>

Another randomized, placebo-controlled trial of ALA supplementation for (1-10days) in patients with type 2 diabetes showed a 25% increase in insulin sensitivity after 4 weeks of ALA therapy at doses of 600–1,800 mg.<sup>13, 14</sup> The long-term effects of ALA have yet to be determined, although one study of patients with type 2 diabetes showed improved glycemic control after 12 weeks of therapy. However, there is no evidence that ALA prevents neuropathy, and longer-term trials are needed to determine whether ALA slows the progression of neuropathy or just improves symptoms.

*Potential side effects:* Side effects of ALA are rare but may include hypoglycemia (if taken in conjunction with insulin or insulin secretagogues), rash, thiamine deficiency in those at risk, and possible interaction with treatment for under-or overactive thyroid.<sup>15</sup>

*Recommended dosage:* ALA is typically given in doses of 600-1,200 mg/day in tablet form. ALA can also be found in liver, spinach, broccoli, brussels sprouts, peas, potatoes, and yeast.

## Magnesium

Magnesium is a cofactor in various enzyme pathways involved in glucose oxidation, and it modifies glucose transport across cell membranes. Magnesium plays an important role in increasing insulin secretion and/or improve insulin sensitivity and peripheral glucose uptake but has no effect on hepatic glucose output and glucose excretion.<sup>16</sup> Hypomagnesaemia is common side effect in patients with diabetes, specifically in patients with glycosuria, ketoacidosis, and excess urinary magnesium losses. Therefore deficiency of magnesium can potentially cause states of insulin resistance.

Based on different types of supplements, absorption of magnesium in the body varies. Forms of magnesium that dissolves well in liquid are more completely absorbed in the gut than less soluble forms.

*Potential side effects:* Magnesium supplements can cause nausea, cramps, and diarrhea. Magnesium supplements often cause softening of stool. Magnesium supplements may not be safe for people who take diuretics, heart medicines, or antibiotics. Signs of a magnesium overdose can include nausea, diarrhea, low blood pressure, muscle weakness, and fatigue. At very high doses, magnesium can be fatal. Because of these warnings people with diabetes, intestinal disease, heart disease or kidney disease should not take magnesium without consulting health care providers.

*Recommended dosage:* Depends on age. For adolescent and adult females recommended dose is 200-360 mg/day in tablet form and in adolescent and adult males the dose requirement is 400-460mg/day respectively. Natural food sources of magnesium include green, leafy vegetables, like spinach, Nuts, Beans, peas, and soybeans, whole-grain cereals.

## BOTANICAL SUPPLEMENTS

Ayurvedic medicine is world's oldest health care system evolved in India. It is named for the Sanskrit word Ayurveda, meaning the "science of life." However there is very limited research to prove the efficacy of these medicines.<sup>17, 18</sup> Listed below are the most common botanical supplements that are plant based and are derived from Ayurveda. These supplements have limited data on their adverse effects due to lack of research but are commonly used by the people with diabetes.

**Table 3: Common Botanical supplements (Herbs or plant derivatives) used to treat diabetes**

| Botanical supplement        | Mechanism of action  | Side effects  |
|-----------------------------|--|---|
| Bitter Melon                | Insulin mimetic<br>decrease in hepatic production  | Diarrhea,<br>gastrointestinal upset,<br>G6PD deficiency,<br>contraindicated in pregnancy  |
| Aloe Vera                   | insulin secretagogue   | acts as laxative and cause electrolyte depletion  |
| Coccinia indica (Ivy Gourd) | insulin mimetic  | No significant side effect reported   |
| Gymnema sylvestre (gymnema) | insulin secretagogue   | No significant side effect reported   |
| Prickly pear cactus, Nopal  | Decreased carbohydrate absorption GI side effects like nausea, abdominal fullness,diarrhea |   |
| Fenugreek                   | insulin secretagogue   | Gas, bloating and diarrhea  |
| Ginseng                     | Insulin mimetic alters hepatic glucose production  | <ul style="list-style-type: none"> <li>• May interfere with anticoagulation and antiplatelet medications</li> <li>• Estrogenic effect with fibrocystic</li> <li>• May interact with multiple antipsychotic medications</li> </ul> |
| Cinnamon                    | insulin mimetic activates glycogen synthetase  | Contains coumarin compounds that can cause hepatotoxicity   |

### Coccinia Indica (Ivygourd)

This is one of the most commonly used herbal supplements. The creeper plant coccinia indica is prescribed in Ayurvedic medicine for the treatment of diabetes. Coccinia may produce hypoglycemia in a mechanism similar to insulin. Several trials<sup>19, 20</sup> found a decrease in fasting blood glucose without adverse effects among type 2 diabetes patients after administration of coccinia. Although data are suggestive of a therapeutic effect for coccinia, further research is necessary to determine optimal preparations, dose, mechanisms, and safety.

*Potential side effects:* Coccinia indica is a plant and its fruit, roots and leaves all are used to make medicine. Ivy gourd appears to be safe for most people when taken by mouth for up to six weeks. There isn't enough information to know if ivy gourd is safe for longer-term use. Not enough evidence is present about its safety in pregnancy and in breast feeding.

Its use should be avoided during this time. Due to its hypoglycemic effect, self blood sugar monitoring is important when taken in conjunction with other medicines

*Recommended Dosage:* There is no standardized dose suggested for this supplement.

### **Cinnamon**

Cinnamon spice is well known in Western countries. There are two types of cinnamon: Cassia and Ceylon. Cassia cinnamon (commonly used for cooking and baking) is the type most commonly used in the treatment of diabetes, as well as for the treatment of gastrointestinal distress. The active ingredient in cinnamon is hydroxychalcone, a substance that is thought to enhance insulin action. Cinnamon has been used for medicinal purposes since ancient times. In a study conducted in University of Peshawar, Pakistan and published in *Diabetes Care*<sup>21</sup> cinnamon lowered blood glucose from 18 to 29% in all three groups with no change in glycemic control was noticed in placebo group. After 40 days, all three levels of cinnamon reduced the mean fasting serum glucose (18-29%), triglyceride (23-30%), LDL cholesterol (7-27%), and total cholesterol (12-26%), but no changes in A1C were reported. Another non-randomized, non-blinded controlled trial in 25 postmenopausal women given 1.5 g/day of cinnamon or placebo for 6 weeks found no significant decrease in mean A1C.<sup>22</sup>

*Potential side effects:* There are few adverse effects from cinnamon. Allergic reactions are rare but possible, in the form of contact dermatitis if used topically.<sup>23</sup> However there are warnings of hypoglycemia in those taking insulin or using an insulin secretagogue. A potential concerning side effect of cinnamon is that it naturally contains a substance called coumarin. Large doses of coumarin, which is also found in celery and parsley, may lead to or worsen liver damage. People with liver damage should use cinnamon with caution. For this reason, some cinnamon supplements are made with water-extracted cinnamon, which may contain less coumarin.

*Recommended dosage:* Standard doses of cinnamon are 1g (1/2 teaspoon) daily. Cinnamon is typically consumed in ground form, sprinkled on foods or used as a spice in baking. It is also consumed as a tea and is available in capsule form and as an essential oil. Cinnamon is present in the market in form of tablets by different brands such as Vitacost, cinnamon extract, truenature Cinsulin.

### **Ginseng**

Asian ginseng is a commonly used in (TCM) Traditional Chinese Medicine to treat diabetes. It exists in three forms: Panax ginseng-Asian Ginseng, Panax quinquefolis-American Red Ginseng (ARG), Eleutherococcus senticosus- Siberian

Ginseng. It has been shown to augment the release of insulin from the pancreas and to increase the number of insulin receptors. ARG roots have increased bioactive phenolic contents, such as cinnamic acid and ferulic acid during the steaming process. ARG, ferulic acid and cinnamic acids has been shown to have hypoglycemic effects and favorable lipid changes in a type 2 diabetic mouse models.<sup>24,25</sup>

Ginseng has many medicinal uses: stress reliever, athletic performance enhancer, energizer, appetite stimulant, immuno stimulant, cancer treatment, oral hypoglycemic agent and life-prolonging agent (adaptogen).

*Potential side effects:* Ginseng may increase blood pressure. Overuse can also cause headaches, insomnia, and palpitations. Ginseng has also had estrogen effects that may cause vaginal bleeding, and symptomatic fibrocystic breast changes. Ginseng also cross reacts with multiple antipsychotic medications such as barbiturates, MAO inhibitors, antidepressants and should not be used with these medications.<sup>26</sup>

*Recommended Dosage:* The recommended dose of ginseng for type 2 Diabetes is 200 mg tablet daily.

### **Agaricus Mushroom**

This mushroom enhances the serum adiponectin concentration which decreases insulin resistance in type 2 diabetes. In a randomized double blinded placebo controlled trial patients who took Agaricus blazei Murill (ABM) experienced benefit in decreasing insulin resistance when used together with metformin and a sulphonylurea.<sup>27</sup> This study resulted in significant reduction in HOMA-IR index with p value = 0.04 compared to control group. In addition, the plasma adiponectin concentration increased 20.0% (standard deviation, 40.7) % in the ABM group after 12 weeks of treatment, but decreased 12.0% (20.0) among those taking the placebo (p < 0.001).

*Potential side effects:* These are mild and rare but can cause liver toxicity if taken in high doses. Warnings also include watching for hypoglycemia and pruritus when taken as a combination with other medications. Pregnant women and people with liver disease should avoid taking this supplement.

*Recommended dosage:* The recommended dose is 500 mg TID. It is sold by multiple brand names such as mushroom extract, mushroom wisdom or mushroom immune defense.

### **Gymnema sylvestre**

Gymnema sylvestre is an herb native to the tropical forests of southern and central India and Sri Lanka. It has been used successfully for centuries in the form of leaves with the theory

that chewing leaves cause the loss of sweet taste hence the Hindi name called Gurmar which means “sugar destroyer.”<sup>28</sup> It has been reported to balance blood sugar, control cravings to help weight loss, and blocks intestinal absorption of sugar.<sup>29</sup>

*Potential side effects:* There have been no adverse effects reported. Due to the lack of clinical trials, it is not recommended in pregnancy and due to its hypoglycemic effects it should be taken cautiously with other oral diabetic conventional treatment.

*Recommended dosage:* There is no evidence to support a specific recommended dosage. It is commonly found in a capsule form along with other vitamins and supplements.

### **Bitter Melon (Momordica Charantia)**

As the name suggests (bitter melon), the melon has a bitter taste due to the presence of a chemical called “momordicin”. This vegetable is native to India and Southeast Asia. It can increase the production of beta cells by the pancreas, thereby improving the body’s ability to produce insulin. It also enhances oxidation of glucose, decreases blood glucose levels improving HbA1C.<sup>30</sup> Two small controlled short-term metabolic trials in patients with type 2 diabetes (n = 18 and n = 9) reported acute effects on blood glucose with Momordica charantia fruit juice, as well as subcutaneous vegetable insulin extract. Two other small, uncontrolled open-label trials also reported positive effects on glycemic control after longer-term use (7–11 weeks).<sup>31</sup>

*Potential side effects:* Due to the lack of clinical trials it is not recommended in pregnancy and also considered as fava bean and contraindicated in patients with G6PD deficiency.

*Recommended dosage:* Bitter melon seeds are used to make the oral capsule form and readily available for consumers. However, there is no evidence of recommended dosage.

### **Fenugreek (Trigonella Foenum-Graecum)**

This plant has multiple medicinal uses and is native to India, Mediterranean and North Africa. The seeds of this plant contain an active compound called “trigonelline” which act as a blood sugar lowering agent. Fenugreek is cultivated throughout the Mediterranean and has a long history of herbal use for various ailments such as digestive problems, loss of appetite and inflammatory skin problems. If patient has diabetes, pregnant or nursing, this plant has been reported to be actually good for the patient and the baby.<sup>32</sup> It has been recommended by some pediatricians to consume during the period of lactation to promote and increase lactation. Fenugreek when mixed with food has ability to reduce postprandial blood glucose levels.<sup>33</sup>

*Potential side effects:* Common side effects: diarrhea, dyspepsia, abdominal distention and flatulence, also gives odour in urine which smells like a maple syrup.

*Recommended dosage:* The recommended dosage of fenugreek is 5 to 30 g defatted fenugreek seed powder up to three times daily. Other available form is tincture in a 3 to 4 ml dose three times a day. Alternatively, you can take fenugreek as a tincture in a 3 to 4 mL dose three times each day.

### **Prickly Pear Cactus/Nopal (Opuntia ficus-indica)**

Found in desert regions of North America, Nopal is used in Mexican cuisine and native medicine. Mexican-American patients with diabetes have used Nopal for glucose control.<sup>34</sup> The blood glucose lowering effect of Nopal extract is high fibrous polysaccharide content including pectin which may slow carbohydrate absorption and have insulin sensitizing effect.

*Potential side effects:* Common Side effects are mild diarrhea, nausea and abdominal fullness.<sup>35</sup>

*Recommended dose:* 100-500 grams of broiled stems of prickly pear cactus daily. Doses are often divided into three equal amounts and given throughout the day. It is readily available in the tablet form for the consumers as a dietary supplement.

### **Chia (Salvia Hispanica L.)**

Common name “chia” means “oily”. It was originated in Mexico and grown in Central and South America. It is primarily used for its seed. Active ingredient in Chia is alpha linoleic acid. It also contains even mixture of both soluble and insoluble fiber, dietary protein, calcium, magnesium, iron, and antioxidants. The mechanism of action is unknown but it is assumed that it may decrease post prandial glucose and hyperinsulinemia.

*Potential side effects:* One study reported that high dietary intake of alpha-linolenic acid could increase the risk of prostate cancer in men.<sup>36</sup>

*Recommended dosage:* There is no evidence of recommended dosage of chia seeds. However there are warnings to use it cautiously in patients taking antihypertensive medicines antidiabetic medicines.

### **Aloe Vera**

Aloe is a cactus-like plant that needs hot climate to grow. In the Arabian countries, parts of the aloe plant have been used orally aloe gel as a traditional treatment for diabetes. The gel derived from the meaty pulp of the leaf, taken orally, may produce hypoglycemic effects through  $\beta$ -cell stimulation.<sup>37</sup>

*Potential side effects:* Caution with electrolyte depletion when outer leaf is consumed. Other possible side effects are to avoid

taking in liver and kidney disease. There is no safety reported to use in pregnancy.

*Recommended dosage:* For diabetes 5-12ml of aloe vera juice is recommended twice daily.

Additionally there are many other dietary supplements used worldwide which is widely distributed. Other upcoming supplements include European Bilberry, Holy basil, Oat Bran, milk thistle, Banaba, Salacia, turmeric, Psyllum. These supplements still lack any research data on the efficacy and more studies are needed to support their use to prevent diabetes or other illness.

Additional resources can be found in Table 4.

**Table 4: Resources and reference for additional information on dietary supplements**

| Resources  | Website  |
|--|--|
| National Center for Complementary and Alternative medicine (NCCAM) | <a href="http://nccam.nih.gov">nccam.nih.gov</a>   |
| Medline Plus Drug and Supplement directory                         | <a href="http://www.nlm.nih.gov/medlineplus/druginformation.html">www.nlm.nih.gov/medlineplus/druginformation.html</a> |
| Office of dietary supplements                                      | <a href="http://www.ods.od.nih.gov">www.ods.od.nih.gov</a>   |
| Natural medicine comprehensive database                            | <a href="http://www.Naturaldatabase.com">www.Naturaldatabase.com</a>   |
| Natural standard   | <a href="http://www.Naturalstandard.com">www.Naturalstandard.com</a>   |
| Consumer lab   | <a href="http://www.consumerlab.com">www.consumerlab.com</a>   |
| Allied and Complementary database                                  | <a href="http://www.ebscohost.com/AMED">www.ebscohost.com/AMED</a>   |
| Natural product alert  | <a href="http://www.uic.edu/pharmacy/research/diet">www.uic.edu/pharmacy/research/diet</a>                             |
| Combined health information database                               | <a href="http://chid.nih.gov/">http://chid.nih.gov/</a>  |

Advising patients about CAM: In any health care settings, it is a common trend that patients usually do not disclose their consumption of supplements with the health care providers. With increasing consumption of dietary supplements among the diabetic patients, it is important that clinicians actively inquire about such therapies. Some experts recommend the following mnemonic (HERBAL) when exploring these supplements with patients:<sup>38,39</sup>

- H**ear the Patient out with respect
- E**ducate the patient
- R**ecord and document
- B**eware
- A**gree to discuss
- L**earn about new and popular supplements

The CAM supplements are abundant and commonly found in the market place and patients tend to self-select the supplements without enough knowledge to make an informed decision. Each of these supplements is cost effective and approximate cost of these supplements varies from 6-12 dollars per bottle for 30 days supply depending on the manufacturer. Providers should ask patients why they chose a particular therapy. This will help providers understand patient's familiarity and views about the therapy and nurture communication between providers and patients. After identifying CAM use, physicians can access resources to evaluate further clinical efficacy and safety. However it is also necessary for the physician to communicate the fact that these supplements should be used in addition to diabetes care regimen such as medication, diet and physical activity. Many CAM therapies for diabetes have inconclusive data on efficacy, but are safe such as plant based botanicals from Ayurveda which have been used for centuries and providers may endorse the use of CAM treatments depending on individual patient's need. In such cases, patient counseling and monitored use is reasonable.

## CONCLUSION

Polyherbacy is common in US consumers. With the aging population, increasing chronic diseases and polypharmacy, it is the health care provider's responsibility to enquire and advise about the routine use of supplements. There is a perception that herbs are natural and safe. However, current data does not support this assumption. Regulation of botanical products in the United States allows for marketing without established evidence of its safety. Physicians need to specifically ask about supplement use and monitor patients for potential adverse effects, especially hypoglycemia in patients with diabetes. When counseling patients on CAM use, physicians should respect patient's choices regarding self-management, while providing evidence-based information about their efficacy and adverse effects. Physicians have an opportunity to assist patients to make right decisions about the most safe and effective CAM remedies to consider as the research grows in this field.

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