

Gymnema Sylvestre:

An Ancient Herbal Remedy for Diabetes Mellitus

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Diabetes mellitus is a growing concern not only for the U.S., but for other countries as well. Diabetes is a disease marked by an inability of glucose to penetrate and fuel the cells of the body. Without glucose, cells lack a vital nutrient to perform daily functions. The hormone insulin facilitates the uptake of glucose into the cell, binding to structures known as insulin receptors. In type 1 diabetes, the body's white blood cells attack and destroy their own insulin-secreting beta cells. Patients with type 1 diabetes receive this disorder genetically and must take insulin injections in order to survive. In contrast, type 2 diabetes is caused by lifestyle choices such as smoking, maintaining a poor diet, and failing to regularly exercise. These cause insulin receptors to become desensitized and to reject insulin in the body. Patients with type 2 diabetes usually take an oral supplement to increase receptor sensitivity.

In both types of diabetes, prolonged periods of high blood glucose levels (BGL) can have dangerous consequences, leading to kidney disease, heart disease, nerve damage, and retinopathy among other conditions. The increase of diagnoses and secondary conditions has led to a rising economic strain on healthcare systems around the world. From 2000-2001 Australian Medicare spent a total of \$784 million on diabetes complications, and in 2007 this number rose to \$174 billion in the U.S. (Dixon, 2005) (US Centers for Disease Control and Prevention, 2011). Today, 347 million people have diabetes, and this number is projected to increase to 438 million by 2030 (World Health Organization, 2013) (World Diabetes Foundation, 2011).

Although using alternative treatments may not reduce the incidence of diabetes, there is significant reason to believe it can slow it down and, in certain cases, reverse the progress of the disease. *Gymnema sylvestre* is an herb currently prescribed in the Indian Ayurvedic healthcare system to treat patients with both type 1 and type 2 diabetes mellitus. Originating from the ancient Santal tribes of India, gymnema has been used for centuries as a safe and effective "anti-

diabetic remedy” (Leach, 2011). By understanding *Gymnema sylvestr*'s benefits of safety, efficacy, and cost-effectiveness, US scientists may be able to offer an exciting new treatment for diabetics and new investigative research that may lead to finding a cure.

Indian Ayurvedic medicine may prove to be a useful model for herbalism in the United States. Ayurvedic healthcare involves the use of natural herbs to bring balance to the body and to keep it free from disease. Preparation and treatment of herbs is often complex, ranging from simple herbal teas made from dried leaves to encapsulated herbs made from “burning”, “boiling”, or “pulverization” (Ayurvedic Pharmacopoeia of India, 2007). Although these methods of preparation vary greatly from one another, the Indian government provides regulations on these herbs to ensure consumers receive the safest and most effective treatment.

The U.S. government currently does not have the type of herbal regulation seen in India. Instead of direct federal involvement, manufacturers are held responsible for ensuring the safety and efficacy of their products and are free to write their own policies. This allows for variability around the herbal market, causing one supplement to be safer or more effective than another. Although the FDA has outlawed companies from placing harmful substances into herbal supplements, there is no law stating these herbs must be clinically proven to be safe or effective. Rather, it is only after the supplement has harmed the consumer that the FDA analyzes the product's contents (Food and Drug Agency, 2009).

Lack of FDA approval not only limits the quality of herbal medicine in the U.S., it also handicaps further research in the herbal field. There are currently very few scientific studies devoted to analyzing specific herbal properties, and many of these studies have only been conducted in India (Shanmugasundaram, 1990) (Baskaran, 1990) (Al-Romaiyan, 2010). With herbal regulation in the U.S., quality studies could improve. Greater experimentation on herbs,

like evaluating their effects on the body, could yield important findings in modern medicine. Specifically, further research with *Gymnema sylvestre* may reveal the source of the herb's unique ability to regenerate beta cells: a discovery that could lead to curing autoimmunity in type 1 diabetes.

Although there has not been a substantial amount of research spent on gymnema, many studies such as Baskaran and Shanmugasundaram's 1990 human trials with the gymnema extract GS₄ reveal not only the herb's characteristic of normalizing blood glucose levels, but also its significant ability to regenerate damaged beta cells in the pancreas. This important property sets gymnema apart from other modern supplements that only reduce blood glucose levels.

In a separate study by Al-Romaiyan (2010), a different extract of gymnema known as OmSantal Adivasi (OSA) was tested on patients with type 2 diabetes and on normal human cells in test tubes, acting as a control group. In the first part of the experiment, eleven newly diagnosed diabetic patients were given an oral dose of one gram of OSA per day for a period of sixty days. The patients' BGL and body weight were monitored, and after the final day, results showed a decrease in BGL and an increase in insulin production.

In the controlled setup of the experiment, insulin secretion was monitored in normal human cells separately, and in cultures with a small amount of OSA. The final results concluded that OSA increases the overall production of insulin in healthy patients and in diabetics by restoring beta cells. This experiment not only supports the claim that gymnema reduces the BGL of diabetics, but that it also maintains a safe BGL in normal human cells that may become exposed to high blood glucose levels, or hyperglycemia, preventing early symptoms of prediabetes. This discovery suggests that gymnema is a safe and preventative treatment for controlling blood glucose levels (Al-Romaiyan, 2010).

Other oral hypoglycemic supplements, such as metformin, are only recommended as treatments and can have dangerous side effects if taken before diagnosis (Allweiss, 2007). Metformin, although an effective hypoglycemic (low blood sugar) medication, can cause a fatal disease known as lactic acidosis in diabetics who unknowingly have end stage renal disease (Perrone, 2011). Gymnema, however, is a safe treatment for diabetics without side effects. Furthermore, Dr. James Duke, with over thirty years of experience in botany and twenty-four published books on herbs and their uses, considers gymnema to be “almost as safe as a cup of coffee” (Duke, 2002).

In addition to reducing hyperglycemia and potentially decreasing the risk of developing diabetes, there is evidence that *Gymnema sylvestre* may physically as well as mentally benefit type one diabetic patients. In Dr. Shanmugasundaram’s 1990 study, there were no cases of the nausea, vomiting, or insomnia often associated with herbal therapies. Instead, all twenty-seven patients were able to decrease their daily amount of insulin injections and five patients claimed to have a “greater sense of alertness of mind and body” (284). This experiment concludes that using gymnema as a supplement can create a more positive outlook and can better maintain BGL in diabetics than can using insulin alone .

In a similar study, Dr. Shanmugasundaram of the University of Madras gave twenty-two type 2 diabetic patients a small dose of gymnema daily for eighteen months to test the effects gymnema had on other hypoglycemic medications the patients were already taking. The results revealed a significant decrease in patient BGL, allowing nearly all the patients to decrease the dose of their oral medications. Three patients described a loss of pain previously felt under traditional oral medications, while five others were able to use gymnema as their sole hypoglycemic treatment. These two experiments suggest gymnema’s safety of treatment and

efficacy in regenerating beta cells, making the herb an effective supplement for type 2 diabetes (Baskaran, 1990).

Besides safely regulating blood glucose levels in diabetics and slowing the onset of debilitating diseases, gymnema can also help benefit the economy. Medical expenses are on average 2.3 times higher for those with diabetes than for those who do not have diabetes, and this number is likely to increase as more people become diagnosed (World Health Organization, 2013). Although *Gymnema sylvestre* cannot replace vital treatments for diabetes such as insulin, it may be an economically beneficial substitute for oral hypoglycemic supplements in patients with type 2 diabetes and may limit the amount of insulin needed for those with type 1 diabetes. According to an online pamphlet on oral diabetic medications in 2012, the average annual price of metformin, one of the most frequently doctor-recommended hypoglycemic drugs, was \$873 (Consumers Union). Conversely, the current annual price of gymnema is significantly less, with an estimate of less than \$100 per year (GNC, 2011).

However, the main concern is not the price of the treatment; it is the efficacy of the treatment itself. Is gymnema really more effective than doctor-prescribed metformin? While studies show gymnema's hypoglycemic ability and the strong likelihood of beta cell regeneration, these tests are largely insufficient. One of the reasons is that there have been so few human studies with gymnema due to lack of funding and interest. This lack of testing significantly lowers the impact of any noteworthy discovery. Another possible reason for the insufficiency of these trials is that the overall quality of experimentation is not very high, causing allopathic physicians to discredit the results of the current study and to cast doubts on future studies (Leach, 2007). For instance, an experiment run in 1983 tested the effects of gymnema on ten patients without diabetes and six diabetic patients (Khare). The male to female ratio, age

difference, and overall number of test subjects from each party were not controlled, so the final results from the gymnema treatment could have been caused by a number of different factors. Even though this is one of the first studies of its kind to test gymnema on humans, it still influences other more recent experiments simply because there are so few of them. Other studies such as Dr. Shanmugasundaram's 1990 experiment that discovered gymnema's regenerative properties in rats are particularly well-run, describing the goals, procedure, and results in very specific and elaborate detail (Shanmugasundaram 266-268). Unfortunately, mistakes overshadow scientific achievement, and it is these unpolished frontier studies modern scientists often call upon when making judgments about the efficacy of a treatment (Shambaugh, 2011).

Today, millions of people are diagnosed with diabetes mellitus and millions more are expected to be afflicted with the disease in the coming years. Furthermore, diabetes remains one of the most expensive diseases to live with in the world. It is important to continue to research and explore innovative ways to combat this disease which significantly reduces the quality of life for so many. By funding research for *Gymnema sylvestre* and using Ayurvedic healthcare as a model, scientists can broaden the scope of treating diabetes. Studies suggest that further research may lead to drug independence for type 2 diabetics, as well as safe supplementation to reduce the amount of insulin needed for type 1 diabetics. More remarkable, however, is gymnema's unique ability to regenerate damaged beta cells in type 1 diabetes. If scientists can delve into the secrets of how these beta cells are regenerated, there may be a cure for autoimmunity and type 1 diabetes in the near future.

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