

A newer approach in the management of diabetes and reduction of HbA1c level by the use of natural remedies over synthetic drugs

Abstract

Introduction: Diabetes mellitus is a condition in which the level of sugar in the blood rises to above 120mg/dl. When sugar level is increase, the level of Glycated haemoglobin (HbA1c) in the blood is also increases. In this review we did find the natural as well as traditional medicine in the treatment of diabetes and the home remedies that reduces the level of HbA1c and blood sugar. These remedies are inexpensive compare to synthetic medication and less side effects. In this review we summarize the use of cinnamomum, turmeric, ginseng, fenugreek, momordica and many other natural occurring remedies for used in the management of diabetes and related diseases.

Methods: All of the contents and examples of the plans and other parts of the required medication effectively collected from Science direct, PubMed and Google scholar. This is a significant collection of data of diabetes and related reduction of major complication of HbA1c and related diseases.

Results: In terms of scientific study the cause of diabetes mellitus is generally started with the increase level of free radical generation in the body which can cause misleading of chain formation in the cell. In general physical terms, diabetes developed due to lack of physical exercise and choosing the wrong lifestyle patterns in terms of food, stress, sleep etc. With the help of physical exercise along with the use of medicinal plants the development of diabetes can be managed. These medicinal plants have free radical scavenging property; reduce the level of free radicals in the body, repair the body parts by oxidation and detoxifies the blood. These plants contains the active ingredients of antioxidants, flavonoids, vitamins, proteins, diosgenins and other specific compounds that signifies β -cell cell performance with reduction of blood glucose level.

Conclusion: The article signifies the effect of natural medicines and revised the reuse of plant medication for the future use in the treatment of microvascular and macrovascular diseases. These are affordable and easy to found in the market with a small procedure to take. According to this review the natural medication is easy to use and have a wide variety of components to treat and manage the over the life threatening disease. We must have use the natural medication for showing tremendous results.

Keywords: natural medicine, diabetes, HbA1c, sprouted fenugreek seeds, cinnamon

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Introduction

There are lots of herbal medicines are kept unaware about its use in some of the life threatening diseases. This issue includes the use of traditionally medicines in some of the major health problems such as microvascular complications (Diabetes retinopathy and diabetes neuropathy) and macrovascular diseases (Stroke and heart disease). Herbal products are not limited to dietary way of use; they can also use in the management of diabetes.¹ Diabetes is a condition in which the level of the glucose in the body is increases to above 120mg/dl. Long time development of diabetes can cause increase the level of glycated haemoglobin (HbA1c). It develops in the body when haemoglobin a protein that carries oxygen, combines with the sugar molecules and gets “glycated”, this form of protein is known as glycated haemoglobin or HbA1c. It is measured after 3 months because the life span of RBCs is about 8-12 weeks. Besides that there

are some naturally occurring plants are available in household and in the market to reduce the level of HbA1c and have tremendous effect over the body.² These herbals medicines include are-

Cinnamomum zeylanicum

Journal of the American Board of Family Medicine stated that, “cinnamon (bark powder) lowered the amount of HbA1c by 0.83% compared with standard medication alone lowering HbA1c level to about 0.37%. Consumption of cinnamon significantly lowers serum HbA1C in type 2 diabetic patient with HbA1c more than 7.0 in addition to usual care.³ According to researcher, cinnamon possess a positive response on the glycemic control and the lipid profile in patients with T2DM. The effect is seen due to it contains 18% polyphenol content in dry weight of cinnamon. This popular Indian spice mostly used in Indian kitchen improve insulin sensitivity and blood glucose control over the use of synthetic drug (Figure 1).⁴



Figure 1 Powder and bark of cinnamomum zeylanicum.

Turmeric

Turmeric is a popular spice in Indian cooking for using a while. Because of his antibacterial, anti-inflammatory and antioxidant properties it is used traditionally. It also helps diabetic patient for manage more stable blood sugar levels and to reduce HbA1c level.⁵ Turmeric boosts body immunity and prevents some of the infections that cause diabetes. Turmeric contains “curcumin an active compound that effective in reducing plasma glucose level, HbA1C and improving the level of lipid profile. Many of the diabetes patients also suffer from arthritis, in this situation turmeric possess a key role in reduction of inflammation and joint paints (Figure 2).⁶



Figure 2 Turmeric root and powder.

Ginseng

Researcher studied that ginseng being tested on animals and humans models not only reduce insulin resistance but also lower HbA1C levels. It is been implicated in Chinese medicine for many years with traditionally the most potent herbs for controlling the blood sugar levels (Figure 3).⁷



Figure 3 Ginseng root reduces level of HbA1.

Sprouted fenugreek seeds

The effect of *T. foenum-graecum* germinated or sprouted seeds has tremendous effect on reducing level of FBS, HbA1c and PPBS. The amount of 25g sprouted fenugreek seeds was received by the patients for three months with a dose of once daily along with diet modification reduce the amount of HbA1c and lowers the level of FBS, PPBS, body mass index, waist hip ratio, BP, pulse rate and the weight of diabetic patients.⁸ In many studies; Fenugreek sprouted or dried seeds lowers the level of blood sugar by slowing down the process of digestion and absorption of carbohydrates in the small intestine. The drug Acarbose has the similar action as that fenugreek (Figure 4).⁹



Figure 4 Sprouted fenugreek seeds.

Gymnema sylvestre

In diabetes condition the usefulness of leaves of *Gymnema sylvestre* (Gurmar, Dhuleti) reduce the level of glucose in the body by improving glycemic control. The patients under the insulin therapy have calculated the effectiveness of *G. sylvestre* leaf extract in managing hyperglycaemia mostly in type 1 diabetes patients. The patients were taking 400mg/day extract of *G. sylvestre* for 18 months significantly decreased the level of FBG, Glycated haemoglobin and cholesterol. It was comparable to that patient taking only insulin therapy.¹⁰ Although, administration of the same extract as 400mg per day for 18-20 months twice daily along with antidiabetic drug reduce the level of FBS and HbA1c in the patient of T2DM. After some time the dose has been reduced. The amount of FBS and PPBS was decreased to about 11 to 13% after 3 months. The level of HbA1c can be reduced upto 0.6-0.8%.¹¹ In another study, patient with T2DM received *G. sylvestre* (1g/day for 2months) had significant decreases in the amount of fasting (1%) as well as post-prandial blood sugar (1%) and increases the level of circulating insulin in the cells and C-peptide for 20 cases (Figure 5).¹²



Figure 5 Leaves and unripe fruit of *Gymnema sylvestre*.

Momordica charantia

This herbal medication is also known as “karela” in Hindi. *M. charantia* is available in all the states of India and it is a key remedy for reducing excess sugar in the body along with HbA1c. The aqueous extract (include 7 subjects) and dried powder of *M. charantia* fruit (5 subjects) were given as a single dose for 3 times. After the period of 3 weeks, the extract amount and the powder remedy reduced 54% and 25% of mean blood glucose level and HbA1c reduced from 8 to 6% by extract solution respectively.¹³ Administration of 2 capsule of *M. charantia* for 3 times daily did not reduce significantly amount of FBS and total cholesterol in T2DM patients. The only observation was on the reduction of HbA1c level to about 0.24% by the use of *M. charantia*.

Panax quinquefolius

P. quinquefolius is also known as American ginseng. There are lots of varieties of ginseng are available in the market but the most commonly and available ginseng is *Panax ginseng* (also known as Korean or Chinese ginseng), a variety of *Panax quinquefolius* (transported from America called as American ginseng) and finally the variety of *Panax japonicas* is known as Japanese ginseng. American ginseng had reported the reduction of post-prandial blood sugar in 9 of the study subjects of T2DM. The patients was receiving 3g of ginseng powder reduce the area under curve of glucose to about 20%.¹⁵ In a double blind placebo-controlled study, Administration of 100-200 mg per day of ginseng in 100 unknown subjects for 8 weeks significantly decrease the level of HbA1c, FBS and also reduce body weight in a double blind placebo controlled study design. In comparison with *P. quinquefolius* to *P. ginseng* and other species is far better to improve glucose tolerance in the patient of newly diagnosed T2DM (Figure 6).¹⁶



Figure 6 Momordica charantia.

Salacia reticulata

S. reticulata is an herbal remedy for reduction of sugar and HbA1c compare to synthetic medication available in the market. It has inexpensive and recommended in the diet for those suffering from T2DM. It is used as aqueous extract from its stem and quantity were 240mg/day for 6 weeks decrease the amount of fasting blood sugar as well as HbA1c. The result got significant when the patient received the tea of *S. reticulata* for three months reduces the level of HbA1c (Figure 7).¹⁷



Figure 7 Panax quinquefolius.

Silybum marianum

Silybum marianum is also called milk thistle and Marian thistle. The seeds of *S. marianum* have been implicated for treatment of T2DM patients for their potential and therapeutic effect. Seeds used for improving the regulation of blood sugar in the liver because the seeds mostly affect on the liver due to presence of flavonolignans a compound called silimarin.¹⁸ In a 2-month randomized double blind clinical study, Silymarin is given to 30 patients with the dose of 200 mg thrice a day for 2 months. This was a randomized double blind clinical trial that reduces FBS, level of HbA1c, triglycerides, TC, LDL, serum glutamic oxalacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) type 2 diabetic receiving conventional therapy.¹⁹ The patient receiving the same dose of silymarin for 4 months reduce the level of glucose, lipids and hepatic enzymes for 25 patients. Some of the significant result have got with add on therapy of silymarin (200mg per day) along with glibenclamide reduces HbA1c and fasting blood glucose in T2DM patients.²⁰ Patients on insulin therapy with alcoholic cirrhosis have significantly reduces the amount of glucosuria, FBS and HbA1c with taking oral consumption of silymarin with a dose of 600mg/day for 4 months.²¹

Eclipta alba

Eclipta alba is an herbaceous plant found in the tropical and subtropical regions of South America, Asia, and Africa. Many chemical compounds, including flavonoids, alkaloids, tryterpens, and other glycosides, have been purified from this plant.²² It is considered to be an important hypoglycemic agent in rural areas of southern India. Oral consumption of leaf suspension of *E. alba* (2 and 4g/kg) for the period of 60 consecutive days caused a significant reduction in blood glucose, glycosylated hemoglobin, glucose-6-phosphatase, and fructose-1, 6 bisphosphatase in alloxan-induced diabetic rats, however the hexokinase concentrations in the liver increased.²³

Nigella sativa

In the study on anti-diabetic activity of *Nigella sativa* seeds, oral administration of plant capsules (at a dose of 2gr/day) significantly reduced FBG, 2 HPG, and HBA1 activities without changing the body weight of the subjects. The results of this study confirmed that applied doses can be used as an adjuvant therapy in type II diabetic people.²⁴

Origanium vulgare

Oral administration of aqueous extract of the leaves of this plant (20mg/kg), in comparison with the standard drug glibenclamide

(0.9mg/kg/BW), caused a significant reduction in glucose level, glycosylated hemoglobin (HbA1c), and pancreatic amylase in STZ diabetic rats.²⁵

Prangos ferulacea (L.) lindl

This plant is used in traditional medicine to relieve pain, inflammation, and help treat diabetes. The major components of extracts from this plant are monoterpenes compounds. The presence of monoterpenes, sesquiterpenes, coumarins, flavonoids, tannins, saponins, alkaloids, terpenoids, and antioxidants are factors in the antioxidant and anti-diabetic properties. In a study on the properties of this plant, it was found that, in diabetic rats, a dose of 100mg/kg of the hydro-alcoholic extract of plant root causes a significant reduction in blood glucose levels, total cholesterol, triglyceride, LDL, glycosylated hemoglobin, and a significant increase in HDL levels.²⁶

Mulberry

Mulberry is another plant found to reduce after-meal glucose spikes by up to 44%. If it works for you that would mean if you spike to 250 after a meal, your level with mulberry would be 140. A study from the University of Minnesota found that glucose didn't rise as high after meals with mulberry tea, and it didn't drop as low afterward. So you might not see much difference in HbA1c, which is like an average blood sugar. But you will probably have far less damage to blood vessels without the spikes and drops. And you will feel better.²⁷

Chloroxylon swietenia

Bark of methanolic and aqueous extract of *C. swietenia* with given to diabetic male albino and Wistar. The treatment group showed moderate reduction in blood glucose level and glycosylated haemoglobin (HbA1c) levels along with improvement of insulin resistance. The result of methanolic extract were comparable to the synthetic medicine glibenclamide.²⁸

Anacardium occidentale

A. occidentale reduces the level of blood glucose to 147.67±6.09mg dl to 123.83±2.87mg dl after 30 days of treatment with female albino Wistar mice model with STZ. It also reduces glycosylated haemoglobin level (HbA1c) and serum insulin level.²⁹ Lastly, the another availability of some herbal plants remedies with *Scoparia dulcis* leaf extract has significant action in T2DM due to its anti-hyperglycemic effects by lowering the FBS and HbA1c levels.³⁰ Dried leaf of *S. dulcis* 200mg kg body weight given to Wister rats for 3 months significantly reduce body weight ($p<0.05$) and shows reduction in HbA1c level.³¹ In recent studies on mild and moderate T2DM patients with randomized trials showed reduced levels of PPBS and HbA1c.³² Hence, *S. dulcis* leaf porridge used as better breakfast option for diabetic patients because of its blood glucose-lowering effect, medium glycemic index (GI) and synergies the effect of oral antidiabetic drug.³³

Conclusion

Every plant has its medicinal value in this world. Plants with anti-diabetes categories were detected for many centuries but the efficacy was not calculated. Now these natural or traditional plants parts have the tendency to treat and manage the diabetic patient and to reduce the level of sugar and HbA1c. They contain sugar decreasing compounds such as flavonoids, vitamins, fibers and full of antioxidants properties to enhance the efficacy of product.

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Conflict of interest

The author declares that there is no conflict of interest.

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