A REVIEW OF HERBS USED TO REGULATE BLOOD SUGAR LEVEL

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ABSTRACT

Different benefit of various herbal medicine in reducing blood sugar have been reported in different clinical trials for great distance. Considering the growing tendency toward these mixture the booming market, inappropriate advice is growing accordingly. Hence, it's necessary to evaluate the effects and possible complications of such combinations on health status and blood glucose control.

Diabetes is a serious metabolic disorder and many of medical plant are used in traditional medicine to treat diabetes. These plant have no side effects and many existing medicines are derived from the plant. The purpose of this systematic review is to study diabetes and to condense the available treatments for this disease, focusing especially on herbal medicine.

The molecular genetics of diabetes received extensive attention in recent year by many prominent investigator and research groups in the biomedical field. A large arrangment of mutations and single nucleotide polymorphisms in genes that play a role in the various steps and pathways involved in glucose metabolism and the development, control and function of pancreatic cells at various levels are reviewed.

Keywords: Diabetes, Classification of diabetes, Type 1 diabetes, Type 2 diabetes, diet

INTRODUCTION:

Diabetes mellitus (DM) also known as simply diabete, is a group of metabolic disease in which there are high blood sugar levels over a prolonged period This high blood sugar produces the symptom of frequent urination, increased thirst, and increased hunger. Untreated, diabetes can cause many complications. Acute complication include diabetic ketoacidosis and nonketotic hyperosmolar coma. Serious long-term complication include heart disease, stroke, kidney failure, foot ulcers and damage to the eyes. (1)

Diabetes mellitus is a group of metabolic disease characterized by chronic hyperglycemia resulting from defect in insulin secretion or insulin action . Metabolic abnormalities in carbohydrate, lipid, and protein result from the importance of insulin as an anabolic hormone. Low levels of insulin to achieve adequate response or insulin resistance of target tissues, mainly skeletal muscle, adipose tissue, and to a lesser extent, liver, at the level of insulin receptor, signal transduction system, or effector enzyme or genes are responsible for these metabolic abnormalities. The severity of symptom is due to the type and duration of diabetes. . Uncontrolled diabetes may lead to stupor, coma and if not treated death, due to ketoacidosis or rare from nonketotic hyperosmolar syndrome 18

Types Of Diabetes

Type - I diabetes (insulin dependent diabetes mellitus)

Type 1 diabetes, which used to be called juvenile diabetes, Develops most often in young people; however, type 1 Diabetes can also develop in adult. In type 1 diabetes, your Body no longer make insulin or enough insulin because The body's immune system, which normally protects you From infection by getting rid of bacteria, viruses, and other Harmful substance, has attacked and destroyed the cells That make insulin.

Treatment for type 1 diabetes includes

● taking shots, also called injections, of insulin.

● sometimes taking medicines by mouth.

● making healthy food choices.

● being physically active.

● controlling your blood pressure levels. Blood pressure Is the force of blood flow inside your blood vessels.(21)

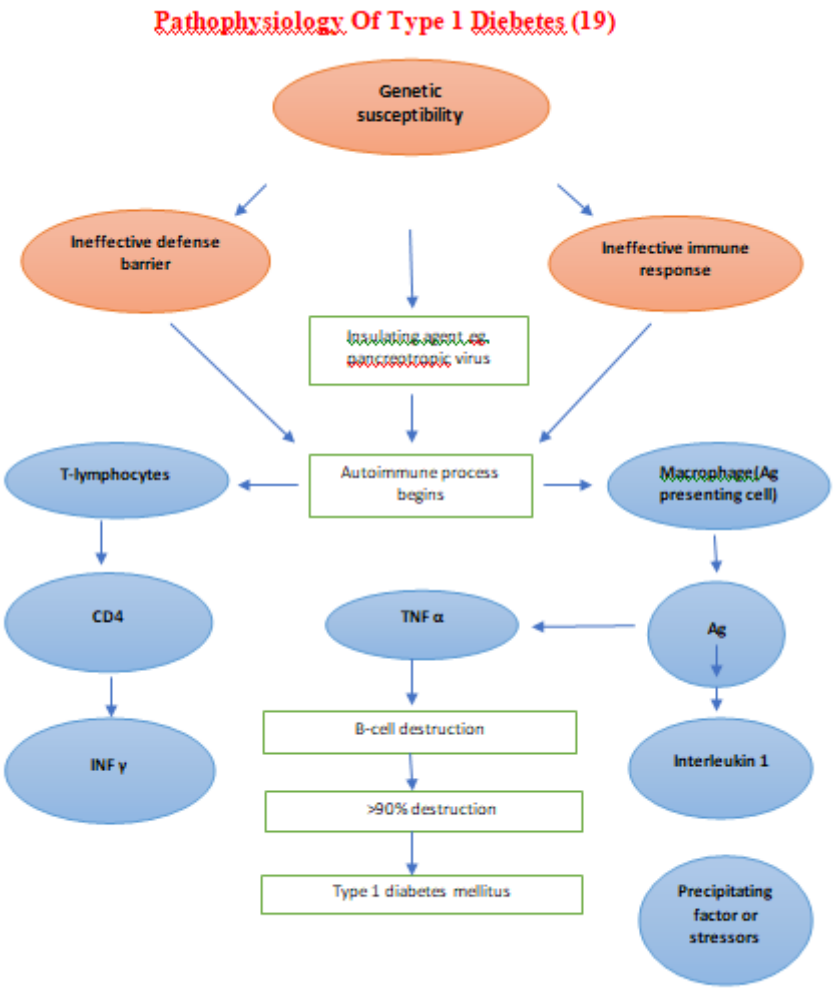
Type - II diabetes (formerly, non-insulin dependent diabetes mellitus)

Type 2 diabetes, which use to be called adult-onset Diabetes, can affect people at any age, even children. However, type 2 diabetes develops most often in middle-Aged and older people. People who are overweight and Inactive are also more likely to develop type 2 diabetes. (22)

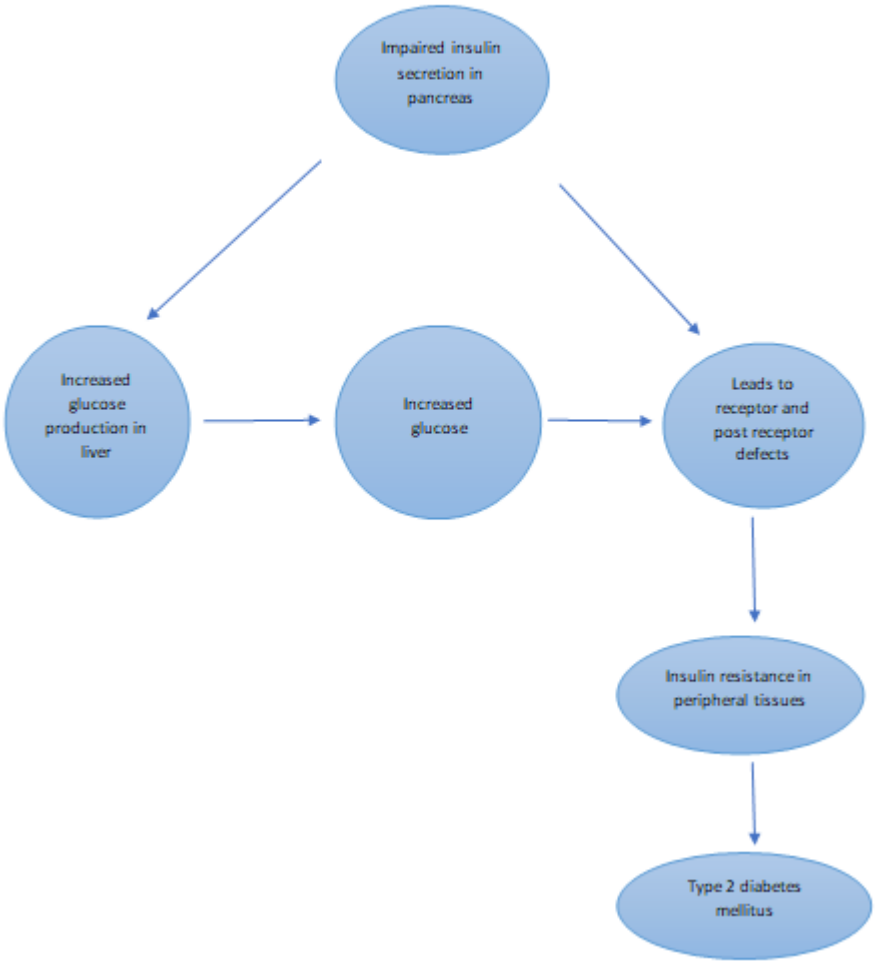
Type 2 diabetes usually begin with insulin resistance—a Condition that occurs when fat, muscle, and liver cells do Not use insulin to carry glucose into the body cells to use For energy. As a result, the body need more insulin to help Glucose enter cells. At first, the pancreas keep up with The add demand by making more insulin. Over time, the Pancreas does not make enough insulin when blood sugar Levels increase, such as after meal. If your pancreas can No longer make enough insulin, you will need to treat your Type 2 diabete.

Treatment for type 2 diabetes includes

- using diabetes medicines
- making healthy food choices
- being physically active
- controlling your blood pressure levels (3)



Pathophysiology Of Type 2 Diebetes (20)



Pathophysiology of type 1 diabetes

The autoimmune destruction of pancreatic β-cells, lead To a deficiency of insulin secretion which result in the Metabolic derangements associated with IDDM. In Addition to the loss of insulin secretion, the function of Pancreatic α-cells is also abnormal and there is excessive Secretion of glucagon in IDDM patient. Normally, Hyperglycemia leads to reduced glucagon secretion, However, in patients with IDDM, glucagon secretion is Not suppressed by hyperglycemia .The resultant in appropriately elevated glucagon level Exacerbate the metabolic defect due to insulin deficiency. The most pronounced example of this metabolic Disruption is that patients with IDDM rapidly develop Diabetic ketoacidosis in the absence of insulin Administration. Although insulin deficiency is the primary Defect in IDDM, there is also a defect in the Administration of insulin. There are multiple biochemical Mechanism that account for impairment of tissue Response to insulin. Deficiency in insulin leads to Uncontrolled lipolysis and elevated level of free fatty Acids in the plasma, which suppress glucose Metabolism in peripheral tissue such as skeletal muscle . This impairs glucose utilization And insulin deficiency also decreases the expression of a Number of genes necessary for target tissues to respond Normally to insulin such as glucokinase in liver and the GLUT 4 class of glucose transporters in adipose tissue. explained that the major metabolic Derangement, which result from insulin deficiency in IDDM are impaired glucose, lipid and protein metabolism (23)

- Effects on glucose metabolism

Uncontrolled IDDM lead to increase hepatic glucose Output. First, liver glycogen store are mobilized then Hepatic gluconeogenesis is use to produce glucose.

- Effect on lipid metabolism

One great role of insulin is to stimulate the storage of Food energy in the form of glycogen in hepatocyte and Skeletal muscle, following the consumption of a meal. In Addition, insulin stimulate hepatocyte to synthesize and Store triglyceride in adipose tissue

- Effects on protein

Insulin regulates the synthesis of many genes, either Positively or negatively, which affect over all metabolism.Insulin has an over all effect on protein metabolism Increasing the rate of protein synthesis and decreasing The rate of protein degradation. (24)

Pathophysiology of type 2 diabetes

Individual with NIDDM have detectable level of flowing insulin, unlike patient with IDDM and the Pathophysiology of type 2 diabetes . On the basis of oral glucose tolerance trial the Essential element of NIDDM can be divided into four Distinct group:

i) Those with normal glucose tolerance.
ii) Chemical diabetes (called impaired glucose tolerance).
iii) Diabetes with minimal fasting hyperglycemia (fasting Plasma glucose less than 140 mg/dl).
iv) Diabetes mellitus in association with overt fasting Hyperglycemia (fasting plasma glucose greater than 140Mg/dl) (25)

The individual with impaired glucose tolerance have Hyperglycemia inspite of having highest level of plasma Insulin, indicating that they are resistant to the action of Insulin. In the progression from impaired glucose Tolerance to diabetes mellitus, the level of insulin decrease Indicating that patient with NIDDM have decrease Insulin secretion. Insulin resistance and insulin deficiency Are common in the average NIDDM patients . Insulin resistance is the primary cause of NIDDM, some researcher contend that insulin deficiency Is the primary cause because a average degree of Insulin resistance is not sufficient to cause NIDDM (26)

Diets

Type 1 Diebetes

1 Choose healthful protein foods

Which includes protein in every meal can help balance blood sugar. People should choose healthy protein foods and vary their choices. Examples of these foods include:

- Lean meat and poultry
- Fish
- Egg
- Beans and lentil
- Tofu
- Nuts and seed
- Low fat dairy food

2 Include nuts, seeds, beans, and legumes

Nuts, seeds, beans, and legumes are good source of fiber, which can slow down the release of sugar into the blood. They are also a source of protein. Example of these food include:

- Nuts: walnuts, Brazil nuts, almonds, and hazelnuts
- Seeds: pumpkin, and sunflower seeds

Type 2 Diebetes

1.Carbohydrates:

percentage of carbohydrates that people with diabetes should eat, it has been shown that the amount and the type of carbohydrates are the main determinants for glycaemic control. Counting carbohydrates has proven to be very important in all patients. It allows a better adjustment of the postprandial blood glucose for those who take insulin. (12)

2.Fiber:

Dietary fiber intake, especially the fiber that provide the natural resource, has shown that improve the control of cardiovascular risk factor, and improved the glycaemic control, turning into a low risk of cardiovascular mortality in people with diabetes (13)

3.Sucrose and fructose:

Contrary to what one might think sucrose intakes of 10%-35% of total energy do not have a negative effect on glycaemic or lipid responses when sucrose is substituted for isocaloric amounts of fructos . Consume free fructose (naturally occurring from foods such as fruit) did not get worsen the glycaemic control more than other forms of sugar, although it should avoid further intake of 12% of daily calories (14)

4.Non caloric sweetener :

Opposite of natural simple sugar there are sweetener with lower calorific value. Most are artificial. They do not have caloric contribution, except aspartame (containing 4 kcal/g), and do not increase blood glucose. These sweetener can be used by diabetic patient. If they are employed to replace glucose, bring the benefit of reducing the kilocalories in the diet (15)

5.Proteins:

It is interesting to make a differentiation between diabetic patient with and without kidney disease. In people without kidney disease, protein intake usually recommended is between 15%-20%; however, reviewing scientific studies no firm conclusion could be reached with respect to this issue. In the literature we can find different randomized clinical trials faced on this issue result. On the one hand there are studies that demonstrate that if 28%-40% of the energy of the diet is taken as proteins there is an improvement of the HbA1c, triglycerides, total cholesterol or LDL cholesterol (16)

6.Fat

Epidemiological studies have related fat with the risk of developing obesity and cardiovascular risk . As in the rest of immediate principle there is no optimal fat proportion and, as a general rule, the recommendation for the general population (between 20%-35%) are applied for diabetic patient, paying special attention if the patient is overweight, then the percentage should be at the lower limit. Despite these recommendation, diabetic patient often take fatter than the recommended (17)

Herbs for type 1 Diabetes

1) **Cinnamon**

Synonyms – amber,bay,beige.,bister,brick.

family- Lauraceae family.

Biological source - is an evergreen tropical tree, belonging to the Lauraceae family, and its dried inner bark is used as a spice or medicine.

Chemical Constituents - Cinnamon consists of a variety of resinous compounds, including cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oils

Mechanism of action

Cinnamon may help support blood sugar management by increasing insulin sensitivity, decreasing blood sugar level after eating, and reducing the risk of diabetes-related complication.(8)

2) Okra

Synonyms :- ladies finger

Family :- Malvaceae

Biological source :- Lady's-Finger, is an edible plant belonging to the Hibiscus family.

Chemical constituents:- phenolic compound, carotein , folic acid, tiamin, riboflavin, niacin,vitamin c , oxalic acid , amino acid, fiber antioxidant.

Mechanism of action :- it stimulate glycogen synthesis in liver and delay intestinal absorption of glucose. Okra product decrease blood glucose and lipid profile through soluble fibe

Herbs type 2 diebetes.

1.Broccoli

Synonyms :- cabbage, kale, collards, coleslaw.

Family :- Brassicaceae.

Biological source :- Broccoli is an edible green plant in the cabbage family

Chemical constituents :- fiber, calcium, folic acid, magnesium, vitamin c, vitamin k.

Mechanism of action :- broccoli sprouts are concentrated sources of glucosinolate like glucoraphanin and they have been shown to help and promote insulin sensitivity and reduse blood sugar level in people with type 2 diabetes when supplement as a powder or extract.(4)

3) Onion

Synonyms :- bulb onion or common onion piazza, basal.

Family :- amaryllidaceous.

Biological source :- An onion (Allium cepa L., from Latin cepa meaning "onion"), also known as the bulb onion or common onion, is a vegetable that is the most widely cultivated species of the genus Allium.

Chemical constituents :- sculpture carbohydrates, proteins, amino acids, polyphenol, quercetin, kaemferol, vitamin B, vitamin C , saponin, B-amyrin, sterols, phenolic acid and minerals.

Mechanism of action :- onion indused reductioin of blood gloucose level because of quercetin flavonoid.(5)

4) Garlic

Synonyms :- lasun, allium sativum.

Family :- amaryllidanceae.

Biological source :- Garlic is the ripe bulb of Allium sativum Linn., belonging to family Liliaceae.

Chemical constituents :- allicin , allin, sulfide, diallyl sulfide, diallyl sulfide, ajoene.

Mechanism of action :- garlic was mainly increased insulin secretion as well as releas from pancreatic beta cell. (6)

5) Kale

Synonyms:- cabbage, cole, collard. Ssicaceae

Family - Brassicaceae

Biological source :- kale edible plant derived from the cabbage of the mustard family (Brassicaceae).

Chemical constituents:- flavonoids, phytochemicals, lutein, zeaxanthin, quercetin, vitamin c, B- carotene

Mechanism of action:- flavonoid antioxidant found in kale including quercetin and kaemeferol have potent blood sugar lowering and insulin sensitizing effect. (9)

6) Turmeric

Synonyms :- haladi,curcuma, indian saffron.

Family:- zingiberaceae

Biological source :- Turmeric is the dried rhizome of Curcuma longa Linn. (syn. C. domestica Valeton).

Chemical constituents:- Curcumin , volatile oil .

Mechanism of action:- Mechanism of action:- turmeric contain curcumin helps improve the function of beta cells which research shows help produce the hormone insulin (7)

7)Spinach

Synonyms :- spinach plat , green, bice, blue green, Kelly.

Family :- amranthaceae.(10)

Biological source :- Spinach (Spinacia oleracea) is a leafy green flowering plant native to central and western Asia.

Chemical constituents :- calcium, vitamin A, vitamin c, fiber, iron, folic acid.

Mechanism of action :- spinach contain reach source of fiber which does not increase blood sugar level (.11)

8) Tomato

Synonyms :- cherry tomatoes .

Family :- solanaceae.

Biological source :- The tomato is the edible berry of the plant Solanum lycopersicum, commonly known as the tomato plant.

Chemical constituents :-phenolic compound like phenolic acid and flavonoids , carotenoids, vitamins, glycoalkaloids

Mechanism of action :- tomatoes are packed with dietry fibers and this provides satiety for long period of time , which curbs odd hunger cravings and also helps in sustain release of sugar in the blood stream (23)

Conclusion

According to review result, it can be said that medical plant are more affordable and have less side effects compared synthetic drugs, and are more effective in treatment of diabetes mellitus.

Hence, these plant may also have anti-diabetic activities and can reduce diabetes complication.

Plants are natural antioxidant and effective herbal medicines, in part due to their anti-diabetic compound, such as flavonoid, tannin, phenolic, and alkaloid that improve the performance of pancreatic tissue by increase the insulin secretion or decrease the intestinal absorption of glucose. More researches are needed in order to separate the active component of plant and molecular interaction of their compounds for analysis of their curative properties.

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