

Herbal medicines for type-2 diabetes

Type 2 diabetes is a clinical syndrome characterized by inappropriate hyperglycemia, caused by insufficient insulin production or resistance to the action of insulin at cellular level, or to a combination of these two factors. It is a major health problem affecting more than 200 million worldwide, and is projected to become one of the world's main disablers and killers within the next 25 years. The management of type 2 diabetes is a global problem until now and successful treatment is not yet discovered. There are many oral hypoglycemic agents developed for patients, but no one has ever been reported to have recovered totally from diabetes. Also there is some fear in the minds of many diabetic patients about the side effects of OHAs, even though there is no scientific basis for it. Thus, there is lot of scope for alternative therapy, either from herbal formulations or indigenous plants, as add on therapy, in the long-term management of type 2 diabetes.^[1]

Before the advent of insulin and oral hypoglycemic agents, the major form of treatment for diabetes was plant extracts or different folk plant preparations prescribed by traditional practitioners. Nowadays, more than 400 plants are being used in different forms for their hypoglycemic effects in treating diabetes, with tall claims of efficacy by patients and practitioners.^[2] Despite the presence of known antidiabetic medicines in the pharmaceutical market, remedies from medicinal plants are used with varying success by a good number of diabetic patients. Further, it has been estimated that in the U.S., 25% of all prescriptions dispensed from community pharmacies contain plant extracts. Plant drugs and herbal formulations are frequently considered to be less toxic and freer of side effects. According to WHO recommendations, hypoglycemic agents of plant origin used in traditional medicine are important in the management of Diabetes.^[3]

The attributed antihyperglycemic effect of these plants is due to their ability to restore the function of pancreatic tissues and thereby increase the insulin output. The other mechanism may be by inhibiting the intestinal

absorption of glucose or facilitation of metabolites in insulin-dependent pathways. These actions of herbal drugs protect the beta cells and iron out the excursions of blood glucose. Another mechanism by which plant extracts help to contain the diabetic pathology is by acting as antioxidants. Free radicals generated by the metabolic process in the body leads to an oxidative stress, damaging different proteins. The antioxidant properties of herbal drugs may be able to help contain this damage. In short, there is very little biological knowledge on the specific modes of action of these compounds, but most of the plants have been found to contain substances like glycosides, alkaloids, terpenoids and flavonoids, which are frequently quoted as having antidiabetic effects.^[4]

Herbal drugs with antidiabetic activity can be classified into four categories according to their mode of action.^[5] The first group of plant drugs act like insulin, the classical example is *Momordica charatia*, extracted from the bitter gourd. The polypeptide isolated from the seeds and other tissues of this plant when administered in animals and humans showed hypoglycemic effects. There are also studies showing the hypoglycemic effect of the acetone extract of the whole fruit powder of *Momordica charatia*.

The second group of herbal drugs is those acting on the beta cells to increase the production of insulin. This group includes *Allium cepa* extracted from onion and *Pterocarpus marsupium*, an extract from the bark of the tree and Aloes. There are experimental studies on animals and humans showing their hypoglycemic effects. The *Pterocarpus marsupium* extract has been studied extensively by Indian Council Medical Research by multicentral double blind trials and shown to be as effective as the sulfonamide, Tolbutamide in controlling Type 2 Diabetes.

The third groups of herbal drugs act by enhancing glucose utilization in diabetic patients. This group includes *Gingiber officinale* from ginger, *Cyamopsis tetragonolobus* from Gower plant and *Grewia asiatica* from phalsa plant. The gower plant and seeds increase the viscosity of gastrointestinal contents, slow gastric emptying and act as a barrier to diffusion.

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The last group of herbal plants with hypoglycemic potency act by miscellaneous mechanisms. This includes leguminous plants, *Euphorbia prostrata*, *Fumaria parvia*, *Panax ginseng* and *Phyllanthus embelica*. These groups of drugs may alter the fiber content and thereby altering the rate and speed of absorption of glucose from the gut.

It is evident that there are many herbal preparations with hypoglycemic effects of varying potency. Since these preparations act by different mechanisms, it is theoretically possible that different combinations of these extracts will do a better job in reducing blood glucose. In the traditional system of Indian medicine, it is usual to use plant formulations and combined extracts of plants are used as drug of choice rather than individual ones. Diasulin, a poly herbal formulation, has been recently shown to be effective in controlling glucose and also controlling lipid peroxidation and other oxidative processes.^[6] Recently, Nima *et al* has shown that a plant formulation - Glycoherb, has good effect as an antihyperglycemic, antilipidemic and antioxidant agent in streptozotocin-induced diabetic rats and was comparable to that of the standard drug, glibenclamide.^[7] In fact, reports on these herbal products abound in the international journal of diabetes in developing countries.^[8-12]

Type 2 diabetes mellitus is a multifactorial disease leading to several complications and as such demands multiple therapeutic approaches. Medicinal plants need to be explored with greater scientific enthusiasm and amalgamated in the modern medicine practice. Isolation and identification of active constituents from these plants, preparation and standardization of the dose, pharmacological and toxicological evaluation of the active principle are the need of the hour. There is also increasing demand from patients to use natural products with antidiabetic activity; hence, the modern medicine must scientifically assess and incorporate these herbal medicines in their anti diabetic drug

armamentarium.

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