It is common knowledge that normal glucose regulation is impaired in diabetes mellitus. The two major classes are type 1 or insulin dependent, and type 2 or non-insulin dependent diabetes mellitus. Where in type 1 diabetes there is almost complete destruction/loss of insulin producing cells resulting in glucose starvation in skeletal muscle, in type 2 diabetes the major manifestations are insensitivity of the pancreatic beta cells to glucose stimulated insulin release and the impairment of skeletal muscle cells to insulin stimulated glucose entry (insulin resistance).

Over the years many natural products, especially plant derived have been used in the traditional medicine for the treatment of diabetes. Apart from their empirical value, the scientific basis for investigating the nature’s inventory of chemical compounds for an anti-diabetic principle forms an interesting inquiry. Insulin is released from the beta cells of pancreas in response to rising glucose in the bloodstream. Interestingly, although glucose is a potent natural stimulator of insulin release from the pancreatic beta cells, there is no evidence to show that primitive man consumed bolus meals comprising of carbohydrates in abundant quantities, to raise the blood glucose levels high enough (180 mg/dL) to stimulate insulin release from the pancreas. Furthermore, nature is also rich in chemical compounds that are structurally similar to glucose. The insulinotropic activities of sulfonylureas which have structural similarities with glucose support this line of thinking. Of late, incretins and incretin mimetics have been used for the treatment of diabetes. Incretins like glucagon like peptide-1 (GLP-1) and gastric inhibitory polypeptide (GIP) are gut hormones released in response to ingestion of food. These are short lived as they are immediately acted upon by dipetidyl peptidase-4 (DPP-4). Apart from modifying the peptide for a longer duration of action, inhibitors of DPP-4 are in clinical use as antidiabetics. The search for natural inhibitors of DPP-4 in some of the plants and their products used for glycometabolic control therefore would merit attention.

Among plant based antidiabetic principles, Panax ginseng, the Asian vegetable bitter melon, Gymnema sylvestre, Fenugreek and Tian Hua Fen (trichosanthes root) are known to contain factors that lower blood sugar levels in diabetics. Interestingly, the parent compound of Hua Fen (trichosanthes root) are known to contain factors that lower blood sugar levels in diabetics. Interestingly, the parent compound of Hua Fen (trichosanthes root) are known to contain factors that lower blood sugar levels in diabetics. Interestingly, the parent compound of Hua Fen (trichosanthes root) are known to contain factors that lower blood sugar levels in diabetics. Interestingly, the parent compound of Hua Fen (trichosanthes root) are known to contain factors that lower blood sugar levels in diabetics.
Figure 1: (A) Glucose tolerance in alloxan-recovered rabbits treated with tolbutamide. Alloxan-recovered rabbits, after an overnight fasting, were orally administered tolbutamide (1 g/kg bdwt). Glucose (3 g/kg bdwt) was administered orally 90 min later. Blood samples were drawn from the marginal ear vein at various intervals as shown and serum glucose concentration was determined by a glucose-oxidase method.

(B) Glucose tolerance in alloxan-recovered rabbits treated with the bark extract (silica gel chromatographic fraction) of Ficus bengalensis. Alloxan-recovered rabbits, after an overnight fasting, were orally administered with the bark extract (1 g/kg bdwt). Glucose (3 g/kg bdwt) was administered orally 90 min later. Blood samples were drawn and analyzed for serum glucose as described in A.

(C) Insulin content of the culture media in which pancreatic beta cells were exposed to: a: none (control); b: DMSO (10 μL/mL); c: glybenclamide (1 mg/mL); and d: fenugreek protodioscin enriched fraction (FPEF; 1 mg/mL). Pancreatic beta cells were grown in 12-well cluster dishes to 60% confluence and then treated with various agents (a-d) in high glucose DMEM medium for 30 min. The insulin content of the medium was determined using an ELISA kit from Crystal Chem (Downers Grove, IL). Data points in A-C represent values of mean ± SEM (A and B) or mean ± SD (n=3; C). In Figure 1C, *p<0.01 and **p<0.05 for DMSO vs. glybenclamide and FPEF treatments (respectively). With regard to (a) untreated controls, the treatments with (c) glybenclamide and (d) FPEF are significant at p<0.05.