

STRATEGIES FOR REDUCTION OF DRUG

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DEPENDENCE IN PATIENTS OF DIABETES MELLITUS

SAGUNNA SIINGH**DR ANURAG SINGH**

The fundamental challenge presented by diabetes revolves around the inadequate action of insulin in the uptake of into the peripheral tissue cells of the body. This inadequacy finds basis in one of the following two fundamental processes:

- a. Inadequate insulin production by the beta cells of the pancreas
- b. Increased insulin resistance (a condition in which insulin is present but its working efficiency in the uptake of glucose into peripheral tissue cells is reduced)

In the article, we will address the above challenges of inadequate insulin production by the beta cells of the pancreas and the increased resistance of body cells to insulin action.

There are several causes of inadequate insulin production by the beta cells of the pancreas. Some of the common causes are listed as follows:

1. **Accident** – causing injury or damage to the pancreas
2. **Infection** – causing a temporary or permanent suppression of the pancreatic function
3. **Medicines / Drugs** – causing a temporary or permanent suppression of the pancreatic function.¹
4. **Auto-immune** – body produces antibodies that attack and destroy the insulin-producing beta cells in the pancreas (like in Type-1 Diabetes Mellitus).²
5. **Other causes**



When it comes to increased insulin resistance of body cells to insulin, lifestyle factors (amongst others) take the lead. Some common factors leading to increased insulin resistance are as follows:

1. Lack of physical exercise³
2. Inappropriate dietary habits⁴
3. Medicines/drugs that reduce insulin sensitivity⁵
4. Fever, cold, cough and other diseases⁶

The moot point in the reversal of low insulin production by the body is that as long as some progenitor stem cells of the beta cells exist in the pancreas, the potential for increase in the natural insulin production by the

pancreas exists. Herbal agents like *Gymnema Sylvestere*⁷ are known for promoting the natural rejuvenation of beta cells in pancreas from their progenitor cells, thereby leading to a natural enhanced insulin production in the body that eventually leads to enhanced peripheral uptake of glucose.

In this article we will outline the different strategies of beta cell rejuvenation that lead to increase insulin production in the body. It must be noted that such strategies point towards a reduced dependence on conventional drugs for the management of diabetes mellitus and possibly provide clues leading to the cure or reversal of diabetes in the future.

STRATEGIES FOR BETA CELL REJUVINATION IN PANCREAS

1. Diabetic Fasting Diet

This is not like keeping a fast. The patient does not keep a fast. Patients are mindful of eating foods in specific combinations at specific times. This strategy has 2 main features.

A. Substituting 50-60% of glucose-rich foods by fructose-rich foods in breakfast and lunch

The rationale for this is that unlike glucose, fructose is a sugar/simple carbohydrate (energy-giving food) that does not require insulin to enter the cells. Hence, the beta cells are not under pressure to produce insulin and get adequate rest for the body's natural rejuvenation process to kick in. In such a scenario, though the blood sugar will rise after taking fructose-rich foods (like apple, pear, etc), it will also fall equally rapidly after few hours (2-5 hours) as there is insulin-independent fructose uptake by peripheral tissue cells.⁸ This fructose is equally efficiently (as compared to glucose) utilized by cells outside the central nervous system (brain and spinal cord) to metabolize and produce energy (ATP) for use by the body. It must be noted that the central nervous system utilizes only glucose as a source of energy. Hence, it is imperative that the diet contains mild to moderate quantities of glucose-containing foods even in diabetics.

B. Staying on a low-glucose diet from lunch to the breakfast of the following day

The rationale for this is that since we are low on glucose (carbohydrates that increase the workload of the pancreas) for 16-18 hours, the load on the beta cells to produce insulin reduces and they get adequate rest to revitalise and the natural rejuvenation of beta cells (and hence natural insulin production in body) also increases.

2. Improving insulin sensitivity

Drugs like metformin and herbs like Ginseng⁹ (especially root extracts from Korea) and Curcumin¹⁰ reduce insulin resistance and thereby improve the efficacy of the already existing insulin in the body. They have had tremendous clinical benefit in reducing medicines/drug/injectable insulin dependence in patients of both Type-1 and Type-2 Diabetes Mellitus. This reduces the pressure on the beta cells to produce more insulin and gives them rest to revitalise, thereby kicking in the natural rejuvenation process to produce more insulin-producing beta cells in the pancreas.

3. Stem Cell Therapy

The latest trends in stem cell therapy done by using mesenchymal progenitor cells indicate that the fresh pancreatic tissue generation leads to improvement of the in-vivo insulin production leading to a direct reduction of dependence on external medicines/drugs, injectable insulin and reversal of pancreatic damage and diabetes.¹¹

4. Herbal Treatment in Diabetes

The pharmacological mechanisms of the herbs can be classified as (1) decreasing carbohydrate absorption, (2) improving insulin sensitivity, (3) increasing peripheral glucose uptake, (4) stimulating insulin secretion, (5) potentiating endogenous incretins, (6) exerting antioxidant effects and

decreasing cell apoptosis, and (7) increasing the glycogenesis or inhibiting hepatic glycogenolysis.¹²

All of the above effects reduce the pressure on the beta cells to produce more insulin and gives them rest to revitalise and rejuvenate.

Education and information regarding the human body's physiology and biochemistry, nutrition and the pharmacokinetics of herbal medicines allows us to develop protocols incorporating dietary habits, herbal preparations and other allopathic methods that will significantly reduce the dependence on drugs for the management of diabetes mellitus. This will lead to exploration of novel methods pointing to the reversal / cure of diabetes in the future.

Endnotes

1. *Oral Hypoglycaemic Medications* by Kavitha Ganesan; Muhammad Burhan Majeed Rana; Senan Sultan
2. *Autoantibodies in Type 1 Diabetes* by Craig E. Taplin and Jennifer M. Barker
3. *Effect of Physical activity on Insulin Resistance, Inflammation and Oxidative Stress in Diabetes Mellitus* by Vignesh Vetrivel Venkatasamy, Sandeep Pericherla, Sachin Manthuruthil, Shikha Mishra and Ram Hanno
4. *Ectopic Fat and Insulin Resistance : Pathophysiology and Effect of Diet and Lifestyle Interventions* by M. Snel, J.T. Jonker, J. Schoones, H. Lamb, A. de Roos, H. Pijl, J.W.A. Smit, A.E. Meinders, I.m. Jazet
5. *Drug-induced Diabetes* by R.E. Ferner
6. *Inflammation and Insulin Resistance* by Steven E. Shoelson, Jongsoon Lee and Allison B. Goldfine
7. *Phytochemical and Pharmacological Properties of Gymnema Sylvestre : An Important Medicinal Plant* by Pragya Tiwari, B.N. Mishra and Neelam S. Sangwan
8. *Dietary Fructose and Metabolic Syndrome and Diabetes* by John P. Bantle
9. *Review of Ginseng Anti-Diabetic Studies* by Wei Chen, Prabhu Balan and David G. Popovich

10. *Curcumin and Diabetes: A Systematic Review* by Dong Wei Zhang, Min Fu, Si-Hua Gao and Jun-Li Liu
11. *Cell Therapies for Pancreatic beta-cell Replenishment* by Bernard Okere, kaura Luccacironi, Massimo Domnicci and Lorenzo Lughetti
12. *Treating Type-II Diabetes Mellitus with Traditional Chinese and Indian Medicinal Herbs* by Zhijun Wang, Jefforey Wang and Patrick Chan

About the Authors

Sagunna Siingh is mother and caregiver of a Type-1 Diabetic child and a Senior Assistant Professor of History in Ramjas College, University of Delhi. She has researched experimented and developed innumerable low-carbohydrate recipes of foods, beverages and deserts for both type-1 and type-2 diabetics.

Dr Anurag Singh, husband of Sagunna Siingh, has passed out from Maulana Azad Medical College and has experience in the diagnosis and management of patients of chronic, autoimmune lifestyle disorders.