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Can We Put a Break on Diabetic Complications?

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Abstract: ***Diabetes has become the most common form of non-communicable disease worldwide. It is widespread in almost every region of the globe, most commonly in South-east Asian nations. It can occur due to unhealthy diet and sedentary lifestyle but once it is neglected it becomes a lifelong part of the diseased person who has to be under regular medications to keep his/her blood glucose levels under check. The more disastrous side of diabetes is that it can lead to several other potential life-threatening complications like cancer. So the need of the hour is to implement those ways in our everyday life which can keep us away from the clutches of this slow-killer. This article is concerned about the measures which can be followed to prevent or put a permanent break on diabetic complications. It also discusses the types of diabetes, causes, symptoms, complications, risk factors and medications available for management.***

Keywords: Glycaemic index, Glycaemic load, Insulin resistance, Hyperglycemia, Hypoglycemia, Polydipsia, Polyphagia, Dysuria, Glucagon, Diabetic retinopathy, ketoacidosis, Diabetic peripheral neuropathy, Metform

1. Introduction

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Hyperglycaemia is a common effect of uncontrolled diabetes and overtime leads to serious complications, especially of nerves and blood vessels. It is becoming an epidemic of the 21st century. In 2014, 8.5% of adults aged 18 years and above had diabetes. In 2019, diabetes was the direct cause of 1.5 million deaths. Between 2000 and 2016, there was a 5% increase in premature mortality from diabetes. By contrast, the probability of dying from any one of the diseases like cancer, cardiovascular diseases or chronic respiratory diseases between the ages of 30 and 70 decreased by 18% globally between 2000 and 2016. All these facts and figures give a sharp indication that this disease is on rise. The latest edition of the IDF Diabetes Atlas shows that 463 million adults are currently living with diabetes.

2. Causes, Risk Factors & Types of Diabetes

When the body's mechanism to maintain its own glucose level is affected, it leads to diabetes. The alpha-cells and beta-cells of pancreas secrete glucagon and insulin hormones respectively. Glucagon uses the stored glycogen and metabolizes it to release glucose, whose level is usually normal in the body (fasting blood glucose level – 80-100 mg/dl & after eating- 170-200 mg/dl). But diabetic patients have impaired blood glucose level (fasting- 101-125 mg/dl & after eating- 190-230 mg/dl or above). As insulin hormone is not produced enough or it is not used efficiently, so it cannot cause proper glucose uptake, consequently the blood glucose level rises. In a normal body, insulin helps control blood glucose levels by signaling the liver, muscles & fat cells to take in glucose from the blood. In presence of sufficient energy, the glucose is stored as glycogen in liver. Glucose metabolism is therefore critical to normal physiological functions. If 90 gm of glucose is metabolized in the body, 27 g is taken up by liver, 25 g by muscles, 2 g by fat cells, 15 g by brain, 8 g by kidneys and the remaining 23 g by other organs of the body.

There are three main types of diabetes – Type 1 diabetes, Type 2 diabetes & Gestational diabetes

Type 1 Diabetes: It is seen generally in teenagers. It is caused by both environmental and genetic factors. It occurs due to an autoimmune reaction in which the body's immune system attacks the beta-cells, as a result the body produces very little or no insulin. Symptoms appear quickly.

Type 2 Diabetes: It is common in adults and older people and it is the most common type of diabetes. Here the insulin receptors become non-functional, a situation termed 'insulin resistance' so other organs do not use insulin well. Obesity and overweight are the root causes of insulin resistance. Symptoms appear more slowly than type 1 diabetes and hence can be often neglected.

Gestational Diabetes (GDM): It is characterized by high blood glucose levels during pregnancy and may occur any time during pregnancy, most likely after week 24, and usually disappears after pregnancy.

The risk factors include- rising levels of obesity, unhealthy diets (increasing consumption of processed foods, foods with high glycaemic index and higher calorie intake) and sedentary lifestyle. Besides these common risk factors, both type 1 & type 2 diabetes share two common factors i.e. genetics/hereditary factor & environmental triggers. If parents are diabetic, children are at higher risk of getting the disease but sometimes may not develop due to environmental triggers (like people of cold climates or certain viruses can trigger type 1 diabetes). It has been found that genes like HLA-DR3 or HLA-DR4 or HLA-DR7 or HLA-DR9 are linked to diabetes type 1. Type 2 diabetes has a stronger link to family history and lineage than type 1.

Symptoms of Diabetes and Diabetic Complications

The symptoms of any of the above type of diabetes are more or less same- excessive thirst, frequent urination, weight loss, blurred vision, fatigue, feeling hungry (due to increase in amount of Ghrelin), slow wound healing, yeast infections etc. These are the early warning signs and symptoms- Polydypsia, Polyphagia & Dysuria- among the most prominent ones.

Gradually it can lead to diabetic complications. Microvascular complications include- glaucoma, diabetic peripheral neuropathy, kidney failure (color of urine may get darker), glycosuria, glucosuria etc. while macrovascular complications include- coronary heart disease, atherosclerosis, fibrosis, stroke, high blood pressure & neuropathy. Other complications are – Alzheimer's disease, hypoglycaemia, proteinurea, ketoacidosis, cataracts, diabetic retinopathy and macular edema.

3. A Break on Diabetic Complications

There are many preventive measures which one can adopt easily to stay healthy & keep the blood glucose level normal. The most important among all is a healthy diet. Avoid more cooked & processed foods & foods with high glycaemic index i.e. GI greater than or equal to 70 (ex- sugary soft drinks, white bread, white rice, potatoes etc.). Foods with high GI are broken down quickly by our body, so we feel hungry sooner & eat more, consequently blood glucose level increases rapidly. Instead opt for low GI foods i.e. GI less than or equal to 55 (ex- pulses, beans, lentils, fruits & vegetables) since they are broken down more slowly, make us feel fuller for a longer time, help control our appetite & cause a gradual rise in blood sugar levels over time.

But our choice of food must be wise since foods with high GI are not necessarily unhealthy & not all foods with a low GI are healthy (ex- watermelon has a high GI where as chocolate cake, fatty & proteinaceous foods have a low GI). So a large amount of a low GI food may increase the blood sugar as much as a small amount of high GI food. We need to take into account the Glycemic load (GL) which includes the planned portion size of a food as well as its GI. Diets with high GI and high GL are associated with increased risk of diabetic complications.

Eating too much of red meat is also not good for health since it increases the arachidonic acid content & as a result we have lots of inflammations.

We should also take fat sources rich in the healthy PUFAs, especially n-3 LCPUFAs & n-6 LCPUFAs (ex- soybean oil, sunflower oil, fish liver oil etc.) and avoid trans-fatty acids. Ideal n-3 & n-6 LCPUFAs ratio is 1:4.

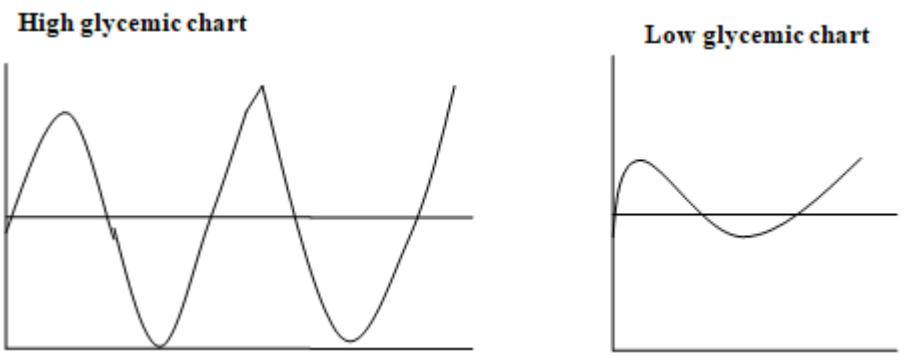
A minimum of 100 g carbohydrates is needed to prevent ketonuria. Foods rich in sucrose & other sugars should be kept low, fructose should be avoided by obese diabetics since it can raise plasma triglycerides more.

A minimum of 50 g proteins should be included in all diabetic diets (since amino acids stimulate insulin secretion) unless he/she is an obese patient.

Along with a balanced diet regular exercise also plays a vital role in prevention. It keeps our weight under control thus preventing obesity & helps in good absorption of glucose. Smoking & alcohol consumption should be avoided.

If diabetic then the following treatment options can prevent from the problem getting aggravated. 'Metformin' is a medication found to lower the risk of complications in type 2 diabetes. Besides tolbutamide, gliquidone, glipizide – also play a role in management of 30% of diabetic patients. In more severe cases, 'insulin' is directly taken by diabetic patients in the form of soluble & depot insulin. Soluble insulin lowers blood sugar levels more quickly but its time period of effectiveness lasts lesser than depot insulin. All young patients who become diabetic before the age of 40 yrs require treatment with insulin. Most patients developing the disease over the age of 40 yrs can be controlled by diet alone.

Intermittent fasting can be done, either 5:2 (normal eating for 5 days & 2 days fasting) or eating in restricted time intervals called early time-restricted feeding can also help. Eating more food in morning or early afternoon than in late afternoon or at night can help in proper glucose metabolism since our body's ability to keep blood glucose levels under control is better during these periods. Such fasting improves insulin sensitivity & pancreas's function. It also lowers the blood pressure & oxidative stress. Below are two glycemic charts, first one is of high GI (where the blood glucose level rises with frequent hunger) & second one is of low GI (where the blood glucose level doesn't show any appreciable rise for a long time).



4. Conclusion

Diabetes, as we saw above, can be prevented by proper diet, time of eating, keeping our body active and weight under control. Further several diabetic complications can be avoided by proper management with diet, exercises and in hard cases, by medications. Regular check-ups of blood sugar level is also recommended so that one can know if he/she has an impaired blood glucose level and can modify

his/her lifestyle before becoming diabetic and dependent on medications lifelong. Nutritional values along with GI and GL of every food we eat must be known. If one follows these simple tips then definitely we can put a break on diabetic complications.