

## **CURRENT CONCEPTS IN DIET AND DIABETES**

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### **Introduction**

Importance of diet in diabetes can be traced back to the days of the ancient ayurvedic physician Sushruta. He attributed the consumption of whole-some foods, besides hereditary factors for the development of diabetes. The ideal diet for diabetes remains to be determined even after decades of experience in the management of diabetes. The dietary recommendations seem to vary from time to time along with the social changes. However, whatever the type of diabetes, diet has remained the sheet anchor in the management of diabetes. Indeed, before the discovery of insulin, diet was the only treatment and was successful at a level of near starvation, for a limited period of time. Many live to eat - diabetics eat to live. Today the pendulum has swung from the starvation diet of Allen to modern high carbohydrate and high fibre diet. The caloric contents of food has also gained importance in planning diets as high caloric consumption results in obesity, glucose intolerance, dyslipidemia, atherosclerosis and coronary artery disease.

Whatever be the mode of treatment, the ultimate goal for all diabetics would be to lead a healthy life despite diabetes. This would be possible only when supported by a proper dietary management as the physical well

being depends entirely upon the quality and quantity of food that is taken every day.

### **Nutritional Management of Diabetes Mellitus**

#### **Overall Goal**

To assist persons with diabetes in making changes in nutrition and exercise habits leading to improved metabolic control.

#### **Specific Goals**

1. Maintain near normal blood glucose levels.
2. Achieve optimal serum lipid levels.
3. Provide adequate calories to :
  - i. Maintain ideal body weight for adults.
  - ii. Allow normal growth and development for children and adolescents
  - iii. Meet increased needs of pregnancy, lactation or recovery from catabolic illnesses.
  - iv. Prevent, delay or treat nutrition related risk factors or complications.
  - v. Improve overall health through optimal nutrition<sup>1</sup>.

### **Recommendations and general principles**

**Calories** : Sufficient to maintain reasonable body weight in adults, allow normal growth /

development in children, provide adequate nutrition for pregnancy / lactation. Usually calculated at 25 calories / kg of ideal body weight/with extra allowances for activities.

**Carbohydrate :** In Indian diets, about 60 to 65 per cent of calories come from carbohydrates.

**Proteins :** 10 to 20 per cent of daily calories. No less than adult RDA (0.8g / kg / day).

**Fat :** Total fat content varies with treatment goals. Saturated fat <10 per cent of calories. Fat to be divided as 50 per cent poly-unsaturated and 50 per cent mono-unsaturated fats.

**Cholesterol :** Less than 300 mg/day

**Sweeteners :** Sucrose of late is not restricted in western diabetic diets<sup>1</sup>. However traditional diabetologists still believe in avoiding direct sugar intake.

**Nutritive sweeteners :** No advantage over sucrose substitute as carbohydrate. Non-nutritive sweeteners : can be used.

**Fibre :** Upto 40 g/day, same as general population.

**Sodium :** <3000 mg/day if normotensive  
<2400 mg/day if hypertensive

**Alcohol :** To be used in moderation

**Vitamins and Minerals :** Same as general population : Individualize if at high risk<sup>1</sup>.

In addition, it should be ensured that the diet is similar to that of the individual and his

family's usual diet, so that compliance to diet is ensured.

### **High Carbohydrate High Fibre Diet in Diabetes**

Our studies during past two decades<sup>2,3</sup> and recent studies from several western countries<sup>4,5</sup> have shown that a high carbohydrate, high fibre diet is ideal for the management of diabetes. Long term clinical and experimental studies shows that the HCHF diet is suitable for Indian diabetics<sup>6</sup>. The advantages of using such a diet are :

- It helps in achieving rapid and sustained control of hyperglycaemia.
- It helps to correct hyperlipidemia when present<sup>7</sup>.
- It does not over strain the pancreas but improves the peripheral sensitivity of insulin<sup>8</sup>.
- The incidence of long term vascular complications also appear to be low with use of the diet.

Proteins play an important role in the glucose metabolism and at least 1/3 of dietary requirement must be from first class protein. The amount and type of fat play an important role in the diet of a diabetic. Fatty acids in fish oils reduce the CAD risk in diabetes. They can lower the plasma lipids particularly triglycerides. It is recommended that the ratio of n-6 : n-3 fatty acids should not exceed 5:1.

### **Alcohol guidelines**

Consumption of alcohol is not advisable as it has more harmful than beneficial effects.

- Alcohol increases blood pressure and triglycerides and heavy drinking weakens the heart muscle (cardiomyopathy).
- It affects liver, pancreas and peripheral nerves.
- Alcohol is high in calories (each milliliter provides 7 calories) but no nutritive value and hence are referred to as 'empty calories'.
- If allowed it should not be more than five per cent of the total calories.
- Avoid regular beer and sweet wine. Include with meals or snacks if on insulin or sulphonylurea.
- Eliminate as far as possible in patients who are overweight and have hypertension or hypertriglyceridemia.
- Do not drink when blood glucose levels are not under good control.
- Don't give into social pressure.
- Never drink and drive.

#### **Artificial Sweeteners**

Non caloric sweeteners like aspartame (Equal), saccharin or sweet-n-low do not add any calories and hence are allowed for diabetics. Aspartame is 300 times sweeter than sugar and contains two natural amino acids which the body can tolerate without any problem. Aspartame is the best artificial sweetener as it is totally sugar free, does not result in weight gain, has an acceptable flavour and stability. The maximum permitted consumption range is 2-4 mg/kg/day.

#### **Glycaemic Index**

The glycaemic index of a food stuff is defined as the blood glucose response of a food stuff in comparison with glucose or some other food standard eg. white bread. A decade ago, glycaemic indices of food stuffs received a lot of attention. Today there is a lot of debate about the value of glycaemic indices, not least because other nutrients present in mixed meals can alter the rates of digestion and absorption of the carbohydrate. But to be fair, glycaemic indices have atleast shown that equivalent amount of carbohydrate from different food sources do not have identical effects on blood glucose levels. There is no apparent relationship between the glycaemic index of the food and its total sugar content.

#### **Dietary Fibre**

Dietary fibre is beneficial in the prevention and treatment of several diseases such as CVD and diabetes. High fibre diets can reduce blood sugar and serum cholesterol and relieve constipation. Excess dietary fibre can cause gastro-intestinal symptoms such as flatulence and diarrhoea. It may also interfere with the absorption of minerals such as iron, calcium and zinc. High fibre foods have low caloric value and low glycaemic index and therefore diabetics should eat more dietary fibre containing foods. Fenugreek seeds contain 50 per cent total fibre and 20 per cent of soluble fibre and they reduce blood glucose and serum lipids like cholesterol and triglycerides. 20 to 25 g (4 to 5 tspn) of fenugreek seeds in two or three divided doses along with food are

recommended. Viscous soluble fibres may reduce postprandial glycaemia and insulinemia<sup>9</sup> and lower fasting LDL cholesterol levels.

#### **Nutrition Therapy for Obese NIDDM**

Weight loss, which is a treatment for NIDDM will improve insulin sensitivity and glycaemic control, lower blood pressure levels, reduce LDL cholesterol and triglycerides and increase HDL cholesterol. A low calorie diet of 800 to 1000 kcal/day is considered safe. Very low calorie diet (VLCD) 400 to 600 kcal/day which is appropriate only for patients with BMI > 30 kg/m<sup>2</sup> however can produce side effects. This diet should contain high quality protein including vitamin and mineral supplements to meet RDA and should be done under medical supervision. Limiting fat intake to 20 per cent of total kilocalories has shown to produce weight loss and significant improvement in blood glucose, triglyceride, serum cholesterol and HDL cholesterol.

It is best to start with a strict calorie restriction (800 kcal/day) and liberalize to allow a more modest, yet long term calorie restriction. Plasma glucose levels should be followed clearly during initial period of strict calorie restriction and to reduce the dosage of hypoglycaemic agents if necessary. Recent research demonstrated that fasting hyperglycaemia and abnormalities of hepatic glucose production, insulin resistance and insulin secretion can be rapidly improved by calorie restriction, even if weight loss is only modest<sup>10</sup>. These are encouraging findings for many obese persons with NIDDM who are unable to achieve substantial weight loss.

#### **Dietary Management of Patients with Diabetic Nephropathy**

Patients are started on a low protein diet once their serum creatinine starts to rise. Patients intake is restricted to 0.6 g protein / kg ideal body weight/per day but it is felt an extra two to six gram protein/day would make the diet more acceptable<sup>11</sup>. To ensure an adequate intake of essential amino acids, 70 per cent of the protein should come from foods of high biological value proteins. Patients who are oedematous or have high blood pressure are advised to follow a 'No Added Salt' diet. For this they can use salt in cooking but must avoid salt at the table and should avoid salty foods within their diet.

Most patients tolerate an unrestricted intake of potassium particularly in the early stages of their treatment. However serum levels must be closely monitored and a restriction introduced once serum potassium levels exceed five meq/litre. Care must be taken not to restrict foods unnecessarily as each restriction only makes the diet more difficult to follow.

In conclusion, certain broad principles are being evolved and followed in the management of diabetics in India.

The broad principles are :

1. Diet should be a balanced diet.
2. It should assist a diabetic to achieve normal standard weight (BMI <25) and achieve weight reduction especially correction of central obesity.
3. Diet should assist in achieving improved glycaemic control (HbA1c < 8%).

4. It should prevent or delay CVD in diabetics as it is the major killer in NIDDM. Saturated fat should be less than 10 per cent of total dietary fat calories. Protein in the diet should be optimum. In children, pregnant diabetics, convalescent diabetics or those who are unstable on a high carbohydrate diet there may be a need to augment the protein intake, while those with renal involvement, protein reduction may be beneficial.
- Type of diabetes, age of the patient, body weight, severity of hyperglycaemia, associated complications and mode of treatment being followed determine the exact allowance and type of diet. This needs to be worked out for each individual diabetic. Dietary management is the cornerstone of diabetes treatment and should receive the utmost consideration by the patient and by the treating physician.

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