Diabetes

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Points to Remember

1. What is Diabetes??
2. Definition
3. Types
4. Risk Factors
5. Signs and symptoms
6. Complications (Acute and chronic)
7. Diagnosis (Laboratory investigations)
8. Prevention

Introduction

- Diabetes is a disease that affects millions of Indians every year. Although there is no known cure for diabetes, several known treatments can control this disease.

- The success of any diabetes treatment depends largely on the patient.

Diabetes, mainly type 2 diabetes is very common in India. By 2025, India is predicted to have the most number of diabetics in the world. Women are as equally affected by diabetes as men.

What is Diabetes

The body is made of millions of cells that need energy to function. The food you eat is turned into sugar, called glucose. Sugar is carried to the cells through the blood stream. It is one of many substances needed by cells to make energy.

Without energy, all cells die.

For glucose to enter the cells, 2 conditions must be present. First, the cells must have enough "doors," called receptors. Second, a substance called insulin is needed to "unlock the receptors." Once these two conditions are met, glucose enters the cell and is used by the cell to make energy.

Diabetes definition

Metabolic disorder of multiple etiology (causes) characterized by hyperglycemia with carbohydrates, fat, and protein metabolic alterations that result in defects in the secretion of insulin, its action or both.

What is diabetes?

- **The majority of intake of food is converted into glucose.**
- **The pancreas produces the insulin hormone, which help the organism to take advantage of glucose.**
- **In persons with diabetes, the insulin does not work. Therefore, the sugar and the fat increase in the blood.**

Types of diabetes

- **Type 1 (Insulin Dependent Diabetes)**
  - **No production of insulin**
  - **Initiates in childhood or adolescence**

- **Type 2 Non Insulin depedent Diabetes(NIDDM)**
  - **Deficient production or improper utilization of insulin(Insulin Resistance) Cell will not respond to Insulin**
  - **Generally initiates after 30 years of age**

- **Gestational Diabetes**
- **Stress Induced Diabetes**
- **IGT(Impaired Glucose tolerance)**
- **Impaired Fasting Glycemia**

Type 1 Diabetes

Type 1 diabetes is usually diagnosed in children and young adults, and was previously known as juvenile diabetes.
In type 1 diabetes, the body **does not produce insulin.** Insulin is a hormone that needed to convert sugar (glucose), starches and other food into energy needed for daily life.

Finding out you have diabetes is scary. But don't panic. Type 1 diabetes is serious, but people with diabetes can live long, healthy, happy lives.

Type 2 Diabetes

Type 2 diabetes is the most common form of diabetes. In type 2 diabetes, either the **body does not produce enough insulin** or the cells **ignore the insulin. (Insulin Resistance)**

Insulin is necessary for the body to be able to use glucose for energy. When you eat food, the body breaks down all of the sugars and starches into glucose, which is the basic fuel for the cells in the body. Insulin takes the sugar from the blood into the cells.

When glucose builds up in the blood instead of going into cells, it can cause two problems:

1. Right Away, your cells may be starved for energy.
2. Over time, high blood glucose levels may hurt your eyes, kidneys, nerves or heart

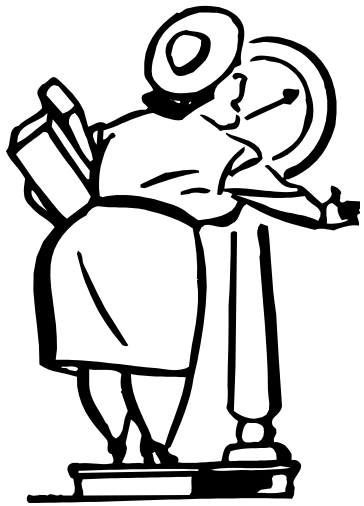
Risk factors

- Family history of diabetes
- Older than 30 years of age
- Lack of physical activity
- Sedentarism (person with little or no physical activity)
- Poor diet
- Excessive weight

Risk factors

- Lack of knowledge on the disease
- No health care access
- Consumption of alcohol and drugs
- Smoking
- Cultural myths

Risk factors



Cardinal Symptoms

Blood glucose level exceeds renal threshold; glucose in urine. Due to osmotic effect, more water accompanies the glucose (polyuria).

To compensate for this loss of water, more water is taken (polydypsia).

Breakdown of protein. loss of weight. To compensate the loss of glucose and protein, patient will take more food (polyphagia).

Common signs and symptoms

- **Weight loss**
- **Fatigue**
- **Changes in vision**
- **Slow-healing cuts or infections**
- **Persistent itching of the skin**
- **Dry skin**
- **Frequent infections**
- **Feet ulceration**
- **Loss of sensibility in inferior extremities (legs)**
- **Erectile dysfunction**

Metabolic Complications

1. Acute Complications (Diabetic Ketoacidosis, Lactic acidosis)

2. Chronic Complications (Vascular, Eyes, neuropathy, **Nephropathy,Preganancy)**

Diabetes complications

- Retinopathy
- Nephropathy (kidney problems)
- Feet ulceration and/or amputations
- Hypertension
- Hyperlipidemia (cholesterol?)
- Erectile Dysfunction
- Gestational diabetes (during pregnancy)
- Diabetes and HIV

Diabetic Ketoacidosis

Ketosis is more common in type 1 diabetes mellitus. When the rate of synthesis exceeds the ability of extrahepatic tissues to utilize them, there will be accumulation of ketone bodies in blood.

This leads to **ketonemia**, excretion in urine (**ketonuria**) and smell of **acetone** in breath. All these three together constitute the condition known as **ketosis**.

Diagnosis of Ketosis

Detection of ketone bodies in urine by **Rothera's test**. Supportive evidence may be derived from estimation of serum electrolytes, acid-base parameters and glucose estimation.

,HOW KETOSIS???????

- In starvation, the dietary supply of glucose is decreased. Available oxaloacetate is channeled to gluconeogenesis.
- The increased rate of lipolysis provides excess acetyl-CoA which is channelled to ketone bodies. The high **glucagon** favours ketogenesis.
- In both diabetes mellitus and starvation, the oxaloacetate is channelled to gluconeogenesis;
- So, the availability of oxaloacetate is decreased. Hence, acetyl-CoA cannot be fully oxidized in the TCA cycle.

Consequences of Ketosis

- **Metabolic acidosis:** Acetoacetate and beta-hydroxy butyrate are acids. There will be an increased **anion gap.**
- **Reduced buffers in blood**
- **Kussmaul's respiration:** due to compensatory hyperventilation.
- **Smell of acetone** in patient's breath.
- **Osmotic diuresis** induced by ketonuria may lead to dehydration.
- **Sodium loss:**
- **High potassium:** Due to lowered uptake of potassium by cells in the absence of insulin.
- **Dehydration:** The sodium loss further aggravates the dehydration.
- **Coma:** Hypokalemia, dehydration and acidosis contribute to the lethal effect of ketosis.

Management of Ketosis

- Administration of insulin and glucose by intravenous route to control diabetes.
- Intravenous bicarbonate to correct the acidosis.
- Correction of water imbalance by normal saline.
- Correction of electrolyte imbalance. Insulin induces glycogen deposition, and along with that, extracellular potassium is distributed intracellularly. This leads to dangerous hypokalemia, which is to be immediately corrected.

Hyperosmolar Nonketotic

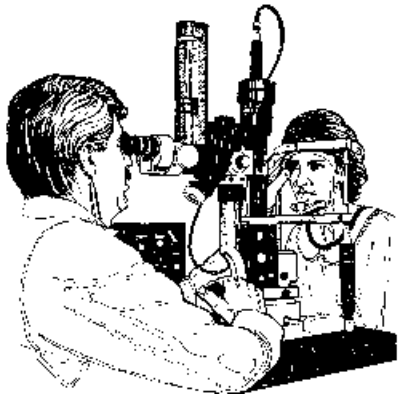
It can result due to elevation of glucose to very high levels (900 mg/dL or more).

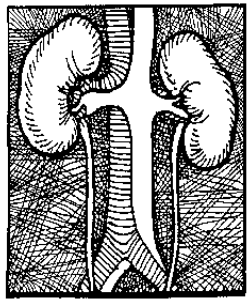
This would increase the osmolality of extracellular fluid (ECF).

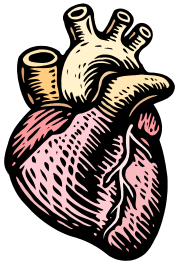
Osmotic diuresis leads to water and electrolyte depletion.

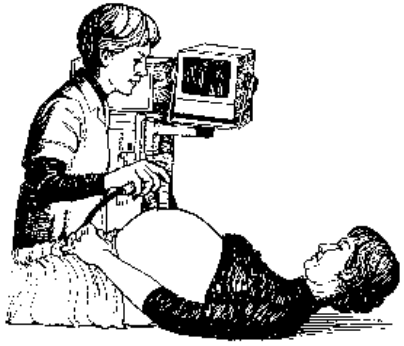
The coma results from dehydration of cerebral cells due to hypertonicity of ECF.

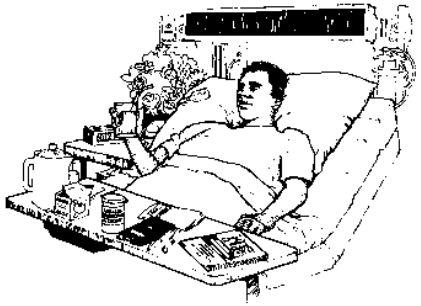
Diabetes complications





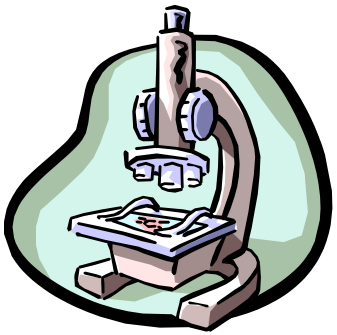






Lab Investigation

- **Symptoms**
  - **(suggest possible diabetes)**
- **High glucose in blood**
  - **(confirm if higher than 126 mg/dl)**
- **Glucose in hemoglobin(Glycated HB)**
  - **(indicates quality of diabetes control - higher than 7 mmol)**
  - **Lipid Profile**
  - **Kidney function Test**
  - **Microalbuminuria**

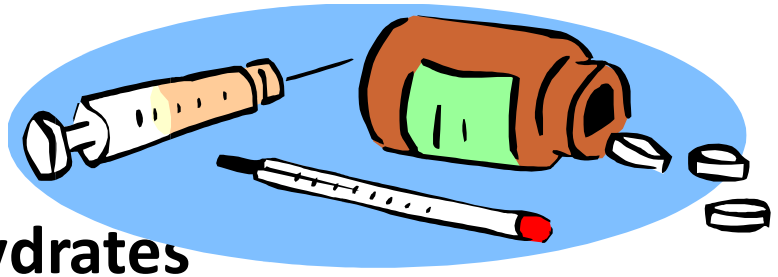


Detection of Diabetes

- Diabetes is detected when a high level of sugar is detected in a persons blood or urine.
- The most reliable test results are obtained when the sugar level in the blood is checked before any food or liquid is ingested.
- This is known as a fasting blood sugar. A range for a normal fasting blood sugar is between 70 and 100 mg/dl.

Treatment and control

- **Medications**
  - **(insulin vs. hypoglycaemic agents)**
- **Increase physical activity**
  - **at least walk for 30 min. most days**
- **Appropriate diet**
  - **vegetables**
  - **fruit**
  - **low in fat and carbohydrates**
- **Lifestyle changes**



Type 1 Diabetes Treatment Options

Patients with Type 1 diabetes do not produce insulin. Patients who lack insulin in their bodies must make certain adjustments in their diet and must take insulin. Insulin can only be given through injections. These injections may need to be given several times a day.

Diabetes Treatment Options

Diabetes cannot be cured. Keeping the level of sugar in the blood within its normal range can, however, control it. The treatment and management of diabetes varies from patient to patient.

Prevention and/or delay of diabetes complications

- Well balanced diet
- Exercise
- Medications when appropriate
- Timely access to health care services
- No tobacco
- No alcohol

Tips for healty cooking

- Cook of boil meat insted of frying
- Take the skin of chicken before cooking
- Use less salt and sugar when preparing food
- Avoid fat

Diabetes can be controlled by



In cases of very high blood sugar levels that do not respond to diet and exercise plans, medications may be needed. If insulin is needed, it can only be injected. Insulin is needed for all patients with Type 1 diabetes and for some patients with Type 2 diabetes.

Diabetes can be controlled by



A healthy diet may include changing what one eats, in what quantities, and how often.

Diabetes can be controlled by



Exercise helps diabetic patients in many ways. It lowers glucose levels, helps weight loss, and maintains a healthy heart and healthy circulation. In addition, exercising helps relieve stress and strengthens muscles.

Diabetes can be controlled by



Blood/urine sugar testing is important in order to find out if the sugar level is where it should be. If the blood/urine sugar is too low or too high, a change in the diabetes medication, diet, or exercise plan may be needed. Blood sugar or urine sugar should be checked at every visit of the diabetic patient.

Summary

Diabetes management consists of:

- Following a diet plan
- Testing blood sugar
- Exercising
- Taking any prescribed medication on time
- Ensuring good hygiene
- Learning about diabetes

Thanks to advances in medicine, diabetes can be successfully controlled. The role of the patient is essential in making a diabetes management plan succeed.