UNIT 4 -HUMAN DISEASE

Diabetes is a metabolic disease or a condition in which the glucose levels in the blood will be high over a prolonged period of time. In other words, it can be defined as a condition that occurs when the body cannot efficiently make use of glucose that serves as a source of energy for body cells. Blood sugar levels are controlled by a hormone called insulin.

Causes of Diabetes

Diabetes is either caused due to the insufficient production of insulin by the pancreas or it may occur if the cells of the body are not effectively responding to the insulin produced.

Types of Diabetes

Diabetes is categorized into the following types based on the reason for their cause:

Diabetes Mellitus

Type 1 Diabetes

Type 2 Diabetes

Diabetes Insipidus

Gestational Diabetes

Diabetes Mellitus

It is the inability of the body to effectively use or respond to the insulin produced by the body, and as a result, blood sugar levels cannot be regulated effectively. Diabetes mellitus is further classified into two types, namely:

Type 1 Diabetes

It is also known as Diabetes Mellitus Type 1. It occurs when the pancreas fails to produce sufficient insulin. The consequent lack of insulin causes an increase in glucose levels in urine and blood.

Type 2 Diabetes

It is also called Diabetes Mellitus Type 2. The prime reason for the occurrence of type 2 diabetes is obesity and lack of exercise in people who are genetically biased.

Diabetes Insipidus

When the body is unable to respond or produce the Antidiuretic hormone (ADH), which is secreted by the hypothalamus, Diabetes Insipidus occurs. This hormone helps the

kidneys manage the amount of water in the human body. Without this essential hormone, the kidneys pass an abnormally large volume of urine that is insipid (meaning: odourless and dilute).

Gestational Diabetes

This condition occurs in pregnant women who develop high blood sugar levels without a previous history. The condition usually resolves after delivery.

Symptoms of Diabetes

Signs and Symptoms vary from person to person, or even there may be no signs sometimes. First, let us come up with common symptoms of diabetes.

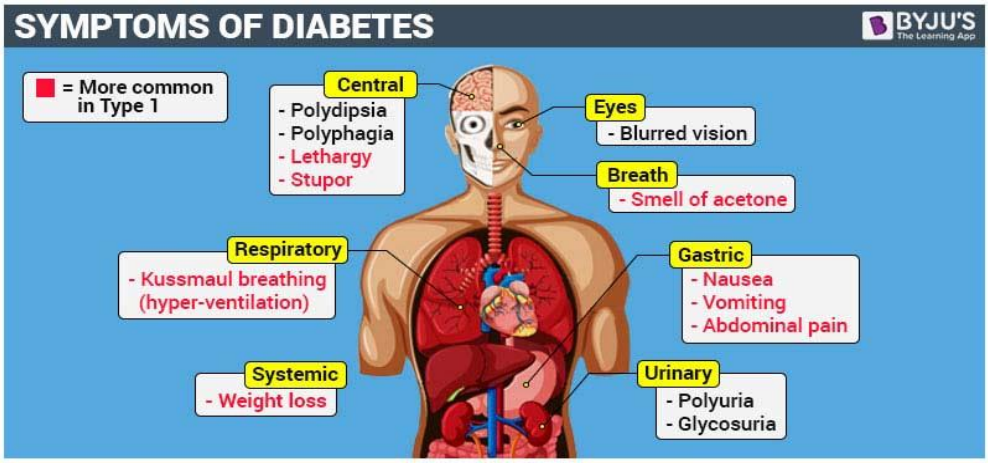
Frequent Urination

Feeling more stressed or tired than usual

Being thirstier

Blurred vision

Loss of Weight



Type 1 Diabetes Symptoms

It is quite easily diagnosed. It is associated with common symptoms of diabetes as well. Other symptoms are stated below.

- Unexplained weight loss.
- Blurred vision.
- Always feeling hungry
- Itching, skin infections
- Having cuts that heal slowly
- Blurred vision

Type 2 Diabetes Symptoms

It is mainly associated with lifestyle factors. Genetics also adds up to the factor. Its symptoms usually go unnoticed. The gradual decrease in weight is one of the symptoms

of type 2 diabetes. They may be a lack of physical activity, obesity, urbanization, and a change in diet.

Symptoms of Diabetes in Women

Some of the symptoms experienced by women are the same as men but there are some symptoms that are experienced only by women. They are stated below.

- They are prone to urinary infections.
- Polycystic Ovary Syndrome.
- Female Sexual Dysfunction.
- Vaginal and Oral Yeast Infections and Vaginal Thrush.

Type 1 and Type 2 Diabetes during Pregnancy

During pregnancy, ketones and blood glucose travel through the placenta to the baby. They require energy from glucose just as a mother requires. Babies are prone to several birth defects if the glucose level is too high.

Gestational Diabetes Symptoms

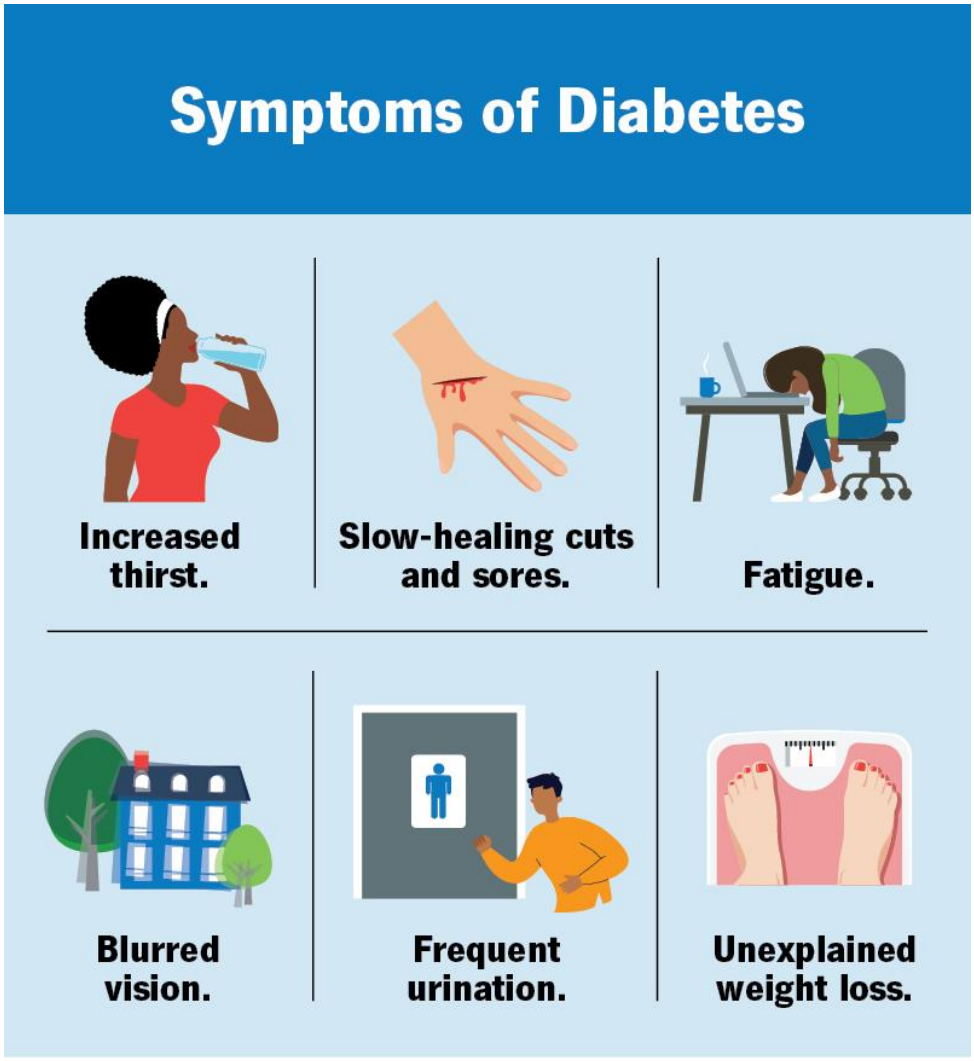
About 9.2 per cent of gestational diabetes occurs during pregnancies. The hormones of pregnancy interfere with a working pattern of insulin, leading to more production of insulin and for some women, it isn't enough insulin which in turn leads to Gestational Diabetes.

How common is diabetes?

Diabetes is common. Approximately 37.3 million people in the United States have diabetes, which is about 11% of the population. Type 2 diabetes is the most common form, representing 90% to 95% of all diabetes cases.

About 537 million adults across the world have diabetes. Experts predict this number will rise to 643 million by 2030 and 783 million by 2045.

Symptoms and Causes



The severity of symptoms can vary based on the type of diabetes you have. These symptoms are usually more intense in Type 1 diabetes than Type 2 diabetes.

What are the symptoms of diabetes?

Symptoms of diabetes include:

Increased thirst (polydipsia) and dry mouth.

Frequent urination.

Fatigue.

Blurred vision.

Unexplained weight loss.

Numbness or tingling in your hands or feet.

Slow-healing sores or cuts.

Frequent skin and/or vaginal yeast infections.

It's important to talk to your healthcare provider if you or your child has these symptoms.

Additional details about symptoms per type of diabetes include:

Type 1 diabetes: Symptoms of T1D can develop quickly — over a few weeks or months. You may develop additional symptoms that are signs of a severe complication called diabetes-related ketoacidosis (DKA). DKA is life-threatening and requires immediate medical treatment. DKA symptoms include vomiting, stomach pains, fruity-smelling breath and labored breathing.

Type 2 diabetes and prediabetes: You may not have any symptoms at all, or you may not notice them since they develop slowly. Routine bloodwork may show a high blood sugar level before you recognize symptoms. Another possible sign of prediabetes is darkened skin on certain parts of your body (acanthosis nigricans).

Gestational diabetes: You typically won't notice symptoms of gestational diabetes. Your healthcare provider will test you for gestational diabetes between 24 and 28 weeks of pregnancy.

What causes diabetes?

Too much glucose circulating in your bloodstream causes diabetes, regardless of the type. However, the reason why your blood glucose levels are high differs depending on the type of diabetes.

Causes of diabetes include:

Insulin resistance: Type 2 diabetes mainly results from insulin resistance. Insulin resistance happens when cells in your muscles, fat and liver don't respond as they should to insulin. Several factors and conditions contribute to varying degrees of insulin resistance, including obesity, lack of physical activity, diet, hormonal imbalances, genetics and certain medications.

- Autoimmune disease: Type 1 diabetes and LADA happen when your immune system attacks the insulin-producing cells in your pancreas.
- Hormonal imbalances: During pregnancy, the placenta releases hormones that cause insulin resistance. You may develop gestational diabetes if your pancreas can't produce enough insulin to overcome the insulin resistance. Other hormone-related conditions like acromegaly and Cushing syndrome can also cause Type 2 diabetes.
- Pancreatic damage: Physical damage to your pancreas — from a condition, surgery or injury — can impact its ability to make insulin, resulting in Type 3c diabetes.
- Genetic mutations: Certain genetic mutations can cause MODY and neonatal diabetes.
- Long-term use of certain medications can also lead to Type 2 diabetes, including HIV/AIDS medications and corticosteroids.

What are the complications of diabetes?

- Diabetes can lead to acute (sudden and severe) and long-term complications — mainly due to extreme or prolonged high blood sugar levels.
- Acute diabetes complications
- Acute diabetes complications that can be life-threatening include:
- Hyperosmolar hyperglycemic state (HHS): This complication mainly affects people with Type 2 diabetes. It happens when your blood sugar levels are very high (over 600 milligrams per deciliter or mg/dL) for a long period, leading to severe dehydration and confusion. It requires immediate medical treatment.
- Diabetes-related ketoacidosis (DKA): This complication mainly affects people with Type 1 diabetes or undiagnosed T1D. It happens when your body doesn't have enough insulin. If your body doesn't have insulin, it can't use glucose for energy, so it breaks down fat instead. This process eventually releases substances called ketones, which turn your blood acidic. This causes labored breathing, vomiting and loss of consciousness. DKA requires immediate medical treatment.
- Severe low blood sugar (hypoglycemia): Hypoglycemia happens when your blood sugar level drops below the range that's healthy for you. Severe hypoglycemia is very low blood sugar. It mainly affects people with diabetes who use insulin. Signs include blurred or double vision, clumsiness, disorientation and seizures. It requires treatment with emergency glucagon and/or medical intervention.

Long-term diabetes complications

Blood glucose levels that remain high for too long can damage your body's tissues and organs. This is mainly due to damage to your blood vessels and nerves, which support your body's tissues.

Cardiovascular (heart and blood vessel) issues are the most common type of long-term diabetes complication. They include:

- Coronary artery disease.
- Heart attack.
- Stroke.
- Atherosclerosis.

Other diabetes complications include:

- Nerve damage (neuropathy), which can cause numbness, tingling and/or pain.
- Nephropathy, which can lead to kidney failure or the need for dialysis or transplant.
- Retinopathy, which can lead to blindness.
- Diabetes-related foot conditions.

Skin infections.

- Amputations.
- Sexual dysfunction due to nerve and blood vessel damage, such as erectile dysfunction or vaginal dryness.
- Gastroparesis.
- Hearing loss.

- Oral health issues, such as gum (periodontal) disease.
- Living with diabetes can also affect your mental health. People with diabetes are two to three times more likely to have depression than people without diabetes.
- Diagnosis and Tests
- Diagnosing Diabetes

How is diabetes diagnosed?

Healthcare providers diagnose diabetes by checking your glucose level in a blood test. Three tests can measure your blood glucose level:

Fasting blood glucose test: For this test, you don't eat or drink anything except water (fast) for at least eight hours before the test. As food can greatly affect blood sugar, this test allows your provider to see your baseline blood sugar.

Random blood glucose test: "Random" means that you can get this test at any time, regardless of if you've fasted.

A1c: This test, also called HbA1C or glycated hemoglobin test, provides your average blood glucose level over the past two to three months.

To screen for and diagnose gestational diabetes, providers order an oral glucose tolerance test.

The following test results typically indicate if you don't have diabetes, have prediabetes or have diabetes. These values may vary slightly. In addition, healthcare providers rely on more than one test to diagnose diabetes.

Type of test	In-range (mg/dL)	Prediabetes (mg/dL)	Diabetes (mg/L)
Fasting blood glucose test	Less than 100.	100 to 125.	126 or higher.
Random blood glucose test	N/A.	N/A.	200 or higher (with classic symptoms of hyperglycemia or hyperglycemic crisis).
A1c	Less than 5.7%.	5.7% to 6.4%.	6.5% or higher.

MANAGEMENT AND TREATMENT

Managing Diabetes

How is diabetes managed?

Diabetes is a complex condition, so its management involves several strategies. In addition, diabetes affects everyone differently, so management plans are highly individualized.

The four main aspects of managing diabetes include:

Blood sugar monitoring: Monitoring your blood sugar (glucose) is key to determining how well your current treatment plan is working. It gives you information on how to manage your diabetes on a daily — and sometimes even hourly — basis. You can monitor your levels with frequent checks with a glucose meter and finger stick and/or with a continuous glucose monitor (CGM). You and your healthcare provider will determine the best blood sugar range for you.

Oral diabetes medications: Oral diabetes medications (taken by mouth) help manage blood sugar levels in people who have diabetes but still produce some insulin — mainly people with Type 2 diabetes and prediabetes. People with gestational diabetes may also need oral medication. There are several different types. Metformin is the most common.

Insulin: People with Type 1 diabetes need to inject synthetic insulin to live and manage diabetes. Some people with Type 2 diabetes also require insulin. There are several different types of synthetic insulin. They each start to work at different speeds and last in your body for different lengths of time. The four main ways you can take insulin include injectable insulin with a syringe (shot), insulin pens, insulin pumps and rapid-acting inhaled insulin.

Diet: Meal planning and choosing a healthy diet for you are key aspects of diabetes management, as food greatly impacts blood sugar. If you take insulin, counting carbs in the food and drinks you consume is a large part of management. The amount of carbs you eat determines how much insulin you need at meals. Healthy eating habits can also help you manage your weight and reduce your heart disease risk.

Exercise: Physical activity increases insulin sensitivity (and helps reduce insulin resistance), so regular exercise is an important part of management for all people with diabetes.

Due to the increased risk for heart disease, it's also important to maintain a healthy:

Weight.

Blood pressure.

Cholesterol.

Prevention

How can I prevent diabetes?

You can't prevent autoimmune and genetic forms of diabetes. But there are some steps you can take to lower your risk for developing prediabetes, Type 2 diabetes and gestational diabetes, including:

Eat a healthy diet, such as the Mediterranean diet.

Get physically active. Aim for 30 minutes a day at least five days a week.

Work to achieve a weight that's healthy for you.

Manage your stress.

Limit alcohol intake.

Get adequate sleep (typically 7 to 9 hours) and seek treatment for sleep disorders.

Quit smoking.

Take medications as directed by your healthcare provider to manage existing risk factors for heart disease.

It's important to note that there are some diabetes risk factors you can't change, such as your genetics/family history, age and race. Know that Type 2 diabetes is a complex condition that involves many contributing factors.

Outlook / Prognosis

What is the prognosis for diabetes?

The prognosis (outlook) for diabetes varies greatly depending on several factors, including:

The type of diabetes.

How well you manage the condition over time and your access to diabetes care.

Your age at diagnosis/how long you've had diabetes.

If you have other health conditions.

If you develop diabetes complications.

Chronic high blood sugar can cause severe complications, which are usually irreversible. Several studies have shown that untreated chronic high blood sugar shortens your lifespan and worsens your quality of life.

In the United States, diabetes is the eighth leading cause of death. A large number of people with diabetes will die from a heart attack or stroke.

However, it's important to know that you can live a healthy life with diabetes. The following are key to a better prognosis:

Lifestyle changes.

Regular exercise.

Dietary changes.

Regular blood sugar monitoring.

Studies show that people with diabetes may be able to reduce their risk of complications by consistently keeping their A1c levels below 7%.