

DIABETES

Diabetes mellitus (DM) is a metabolic disorder characterised by a raised level of glucose (or sugar) in the blood. Known as diabetes, it is the result of either insulin deficiency (type 1) or resistance to the actions of insulin (type 2).

The breakdown of the carbohydrate component in foods containing starch or sugar results in the release of glucose into the bloodstream, transporting it to the body's cells. Insulin, which is produced by the pancreas, is needed to allow the glucose to enter the cells. After entering the cell, the glucose is used to provide energy. With too little or no insulin production, or in instances where the insulin action is ineffective, glucose is unable to enter the cells, thereby accumulating in the blood.

CHARACTERISTICS AND INCIDENCE OF TYPE 1 AND TYPE 2 DIABETES

Type 1

Usually diagnosed under 30 years of age

- Not overweight (slender)
- Rapid onset of symptoms
- Ketones in the urine
- 5 - 10% of all people with diabetes

Type 2

Usually diagnosed over 40 years of age (although with the current obesity epidemic, often diagnosed at younger ages)

- Gradual onset of symptoms or no symptoms at all
- Usually overweight
- Usually no ketones in urine
- 90 - 95% of all people with diabetes

The South African National Health and Nutrition Examination Survey (SANHANES) 2012 estimated that the national prevalence of diabetes (based on HbA1c tests) in persons older than 15 years is 9.5% with 45% being previously undiagnosed. The Survey also revealed the highest prevalence to be among Asian Indian and Mixed Ancestry (coloured) populations. According to the Centre for Diabetes and Endocrinology (CDE) in Johannesburg, another five million South Africans have pre-diabetes (or glucose intolerance), a condition where insulin resistance causes blood glucose levels to be higher than normal, but not high enough yet to be classified as diabetes.

Type 2 diabetes has a strong association with the sedentary and fast-paced western lifestyle: lack of exercise, poor eating habits (particularly sugary, refined, and processed carbohydrate-rich foods) and weight gain (eating more than necessary). This all results in insulin resistance and eventually diabetes, if not managed. Half of the population who has type 2 diabetes in South Africa is at risk of developing heart and blood vessel complications. Previously, type 2 diabetes was a problem in older people, but nowadays, is being diagnosed in young people, including children. The obesity epidemic we are currently facing has serious implications for the incidence of diabetes and other health-related problems (e.g. hypertension), and is expected to get worse if preventative measures are not taken seriously.

DIAGNOSIS

Diabetes is diagnosed using a combination of glucose and HbA1c testing at a laboratory. Fasting glucose is often used as a first-line test, followed by an oral glucose tolerance test. Fasting glucose is collected after an 8–12 hour overnight fast in the early morning, as glucose levels show a progressive decline after 9 a.m. The glucose tolerance test (GTT) identifies abnormalities in the way the body handles glucose after a glucose load, which may often be abnormal before fasting blood glucose levels are. A glucose tolerance test is performed by the administration of a standard glucose dose following the collection of a fasting glucose sample. Further blood samples are then taken at 30–60-minute intervals for 2 hours.

The term HbA1c refers to glycated haemoglobin. It is formed when haemoglobin, a protein within red blood cells that carries oxygen throughout the body, joins with glucose in the blood, becoming 'glycated'. By measuring glycated haemoglobin (HbA1c), clinicians can get an overall picture of what the average blood sugar levels have been over a period of weeks/months.

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Diagnostic criteria for diabetes and intermediate hyperglycaemia/pre-diabetes:

	Plasma glucose (mmol/l) (tested at a laboratory)		HbA1c
	Fasting	Random, postprandial or 2 hour GTT sample	
Normal	< 6.1	< 7.8	<6%
Pre-diabetes	6.1–6.9	7.8–11.0	6–6.4%
Diabetes	≥ 7.0	≥ 11.1	≥6.5%

LIVING WITH DIABETES

Lifestyle changes, including regular exercise, a healthy diet (with smaller portion sizes) and weight loss are the cornerstones of type 2 diabetes treatment, followed by diabetes medication including tablets, and ultimately insulin treatment (as a last resort if it cannot be controlled). Type 1 diabetics usually require insulin treatment shortly after diagnosis.

Diabetes is controllable. Good control of blood glucose levels is essential for prevention of both short- and long-term complications. Blood glucose levels should be monitored as prescribed by the treating physician. This will include frequent self-testing of blood glucose, as well as laboratory tests such as HbA1c (goal < 7%) to evaluate longer-term control during the preceding 4–8 weeks. For people with diabetes this is important as the higher the HbA1c, the greater the risk of developing diabetes-related complications. In general, targets for self-testing of blood glucose are regarded as 4.0–7.0 mmol/l before meals (fasting) and less than 10.0 mmol/l after meals, but these may be adjusted depending on your current health, age, and level of activity.

In patients with type 2 diabetes, associated conditions such as high cholesterol and high blood pressure should also be managed effectively. Other important aspects that need to be monitored regularly include urine testing for the presence of protein (albuminuria), an annual ophthalmologist examination and special attention to foot care with daily self-checks and an annual podiatrist visit.

SHORT-TERM (METABOLIC) COMPLICATIONS

Hyperglycaemia (high blood glucose)

Hyperglycaemia can occur when a person:

- Eats too much food and/or eats the wrong food,
- Gets too little or no exercise,
- Does not take enough medication, or the timing of medication is incorrect,
- Is stressed, and/or
- as an infection or illness.

Warning signs can often be so subtle that you might think they are caused by other conditions. The best way to know whether your blood glucose level is within acceptable limits is to have it tested.

N.B. Untreated hyperglycaemia eventually leads to ketoacidosis and coma, especially in type 1 diabetes. This can happen quite rapidly.

Hypoglycaemia (low blood glucose)

Hypoglycaemia is defined as a value of less than 4.0 mmol/l using self-monitored blood glucose and significant

hypoglycaemia as a value of less than 3 mmol/l.

Hypoglycaemia can occur when a person:

- Skips a meal or does not eat enough,
- Changes usual mealtimes,
- Drinks too much alcohol,
- Exercises more or is more active than usual (without adding extra food),
- Takes too much insulin or other diabetes medication (most common cause) and/or
- Changes the timing when insulin or other diabetes medication is taken.

The warning signs of hypoglycaemia (can initially start off as being vague) include:

- Shakiness,
- Difficulty in speaking,
- Headache,
- Irritability/anxiety,
- Tiredness,
- Weakness,
- Lack of concentration and confusion,
- Hunger,
- Numbness/tingling around the lips,
- Profuse sweating,
- Palpitations,
- Blurred vision,
- Convulsions and
- Coma.

Low blood glucose should be corrected immediately to prevent fainting, a seizure or going into a coma.

LONG-TERM COMPLICATIONS

Long-term complications from uncontrolled diabetes leads to disease of the larger blood vessels (cardiovascular disease), as well as the small blood vessels. Cardiovascular diseases are often seen, especially in type 2 diabetes, and include stroke, heart attack and amputation due to peripheral vascular disease. Disease of the small blood vessels results in eye disease or blindness, kidney disease and kidney failure, nerve damage resulting in a loss of feeling (leading to foot damage), and erectile dysfunction.

CONCLUSION

Although diabetes is a chronic condition, diabetic complications can be prevented by knowledge of the disease, taking responsibility for the condition, and effectively controlling blood glucose by both lifestyle and medical interventions. A change in your way of thinking is needed to adjust to a condition that must be mainly self-managed, and that requires life-long care, control, and commitment.

You could also consider joining a support group in your community. Contact Diabetes South Africa or the Centre for Diabetes and Endocrinology (CDE) for details of a support group in your area and/or for more information on diabetes care. glucose by both lifestyle and medical interventions. A change in your way of thinking is needed to adjust to a condition that must be mainly self-managed, and that requires life-long care, control, and commitment.

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