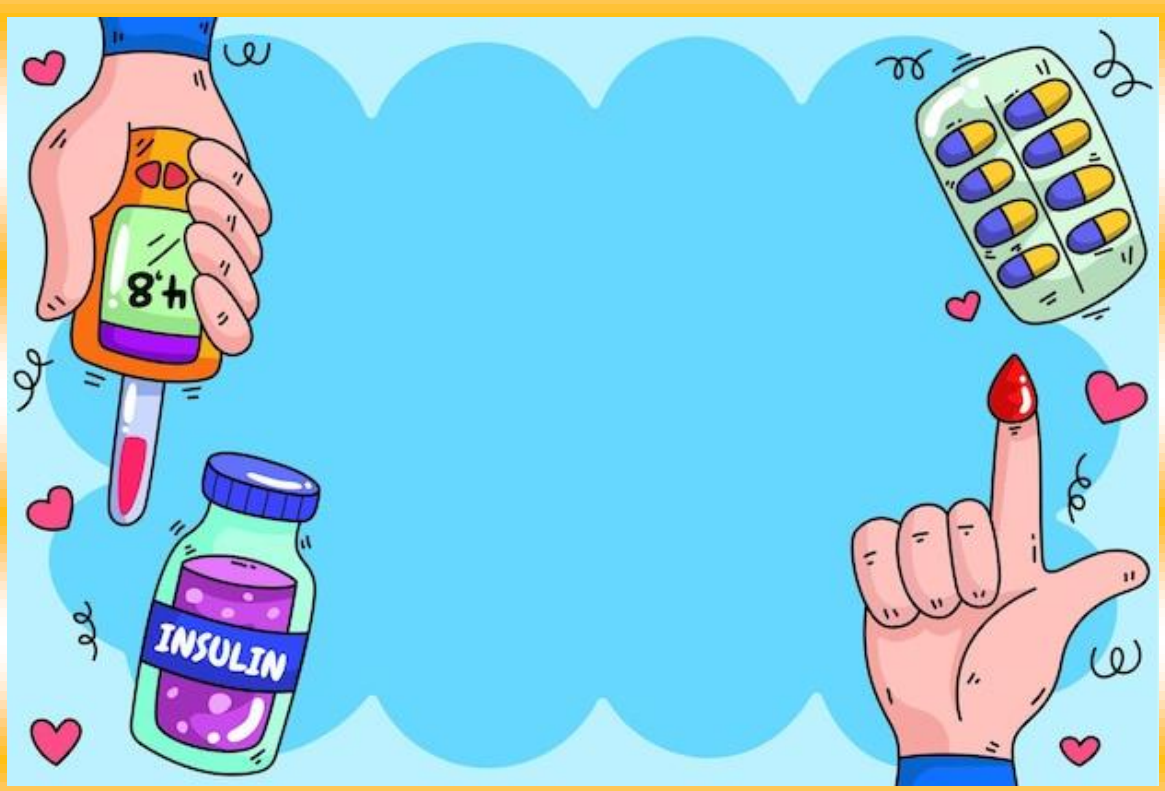
health
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA



https://www.freepik.com/free-vector/hand-drawn-world-diabetes-day-background_18495039.htm

Diabetes Information for Senior Citizens

PATIENT INFORMATION TOOL FOR
MPUMALANGA DEPARTMENT OF HEALTH
BY UCT STUDENTS
2022

MOLEFE MACHABA | BUZWEKAZI MBINDA | BANELE MSIBI

Contents

1. What is diabetes

Diabetes is a disease caused by a series of metabolic conditions associated with high glucose (sugar) in blood. This happens because there is inadequate, or no insulin required to drive sugar out of blood into the cells. The body uses this sugar for energy but chronic exposure to too much sugar will cause harm to blood vessels in the eyes, kidneys, and peripheral nerves (particularly in the foot) (1,2). The damage to these is not easy to detect early because they take time to develop, and they are seen at an advanced stage (1). In South Africa, diabetes is responsible for approximately 14% of cases of ischaemic heart disease, 10% of stroke, 12% of hypertensive disease and 12% of renal disease (2).

Diabetes is a chronic condition which is possible to control like any other chronic condition. It is easy to manage through diet, healthy lifestyle, daily monitoring of blood glucose (sugar) and medication.

There are four main groups of diabetes mellitus(1):

Type 1 diabetes mellitus

It is insulin dependent diabetes mellitus (IDDM). It is a childhood illness

Type 2 diabetes mellitus

It is non-insulin dependent diabetes mellitus (NIDDM). It is most common in adults

Gestational diabetes

It is diabetes diagnosed for the first time in pregnancy

Other types

These are less common types of diabetes

In this booklet Type 2 is the focus to prevent above-mentioned complications in adults. The remaining 3 types of diabetes will be discussed separately.

2. *How common is type 2 diabetes?*

Diabetes remains a major public health concern worldwide (2). The prevalence of type 2 diabetes has increased twofold from 5.5% in 2000 to 9% in 2009. The current prevalence is at 15.25% for age group 25 years and older (2). South Africa is further faced with quadruple burden of disease which include HIV and AIDS, maternal and child mortality, non-communicable diseases, and injury related conditions (2).

3. *What are the risk factors for diabetes*

The following are the risk factors for developing diabetes (2):

- Age, economic transition, overweight and obesity, High blood sugar level and food transition

1. Age

https://statchatva.org/wp-content/uploads/2019/07/Aging-Silhouette.jpg

As you get older you are at a high risk for developing type 2 diabetes because of increased insulin resistance and impaired pancreatic islet cells which are responsible for producing insulin.

2. Economic transition & migration to urban

https://www.pewresearch.org/wp-content/uploads/sites/3/2018/05/ST_18.04.15_Community_Featuered-Image.png

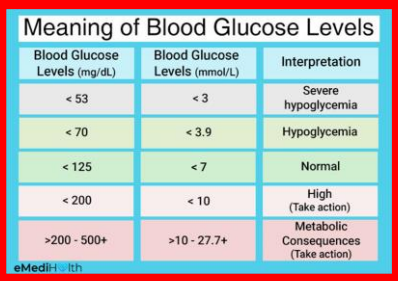
You are at high risk if you are physical inactive and lead a sedentary life (9). We see this in urban area where people rely on public transport instead of walking to and from shopping malls.

3. Overweight & obesity

https://northernnatalcourier.co.za/wp-content/uploads/sites/63/2016/10/obesity1.jpg

Too much body fat worsens diabetes fast.

4. High blood sugar level



Meaning of Blood Glucose Levels

Blood Glucose Levels (mg/dL)	Blood Glucose Levels (mmol/L)	Interpretation
< 53	< 3	Severe hypoglycemia
< 70	< 3.9	Hypoglycemia
< 125	< 7	Normal
< 200	< 10	High (Take action)
>200 - 500+	>10 - 27.7+	Metabolic Consequences (Take action)

eMediHealth

https://img.emedihealth.com/wp-content/uploads/2019/09/diabetes-chart-2-1-600x412.jpg

If your fasting plasma glucose is less than 5.6 mmol/L diabetes is excluded but if it is equal or more than 7.0 mmol/L you are diagnosed with diabetes (1).

If your random plasma glucose is less than 5.6 diabetes is excluded but if equal or more than 11.1 mmol/L you are diabetic

5. Nutrition transition

https://cdn2.howtostartanllc.com/images/business-ideas/business-idea-images/fast-food.jpg

The shift from vegetables, legumes, fruits to refined carbohydrates, sweeteners and animal products increases your risk of developing diabetes type 2 (10).

4. What are the symptoms of diabetes?

Type 2 diabetes symptoms develop very slow and are often missed or ignored by patients (3). The most common symptoms are:

- Thirst
- Tiredness
- Frequent passing of urine
- Eye problems – blurry vision
- Numbness or sensory loss
- Leg or foot ulcers
- Impotence - inability to achieve erection
- Weight loss

5. What are the complications of diabetes?

Complications of diabetes include (1–3):

- Those which occur early:
  - Myocardial infarction – chest pains and heart problems
  - Stroke
  - Peripheral arterial disease
- Those which occur very late with disease progression
  - Eyes – blurry vision
  - Kidney problems
  - Peripheral nerves – diabetic foot - ulcers

6. How is type 2 diabetes diagnosed?

The doctor will take your blood for testing. The following tests are performed to confirm or exclude diabetes (1):

Category	Normal	Impaired/Inconclusive	Diabetes
Fasting Plasma glucose (FPG) (mmol/L)	<5.6 Diabetes excluded	6.0-6.9 Impaired fasting glucose	≥7.0 Diabetes
2hr-plasma glucose (2-hr PG) (mmol/L)	<7.8 Normal glucose tolerance	7.8-11.0 Impaired glucose tolerance	≥11.1 Diabetes
Glycated haemoglobin A1c (HbA1c) (%)	<6.5 Inconclusive		≥6.5 Diabetes
Random plasma glucose (RPG) (mmol/L)	<5.6 Diabetes excluded	5.6-11.0 Inconclusive	≥11.1 Diabetes

7. How is type 2 diabetes managed?

Management of type 2 diabetes will depend on the outcome of the above-mentioned tests.

7.1 Pre-diabetes management

If diabetes is excluded the doctor will encourage you to continue with healthy lifestyle including diet and exercise.

If you have impaired fasting glucose or impaired glucose tolerance or inconclusive results, you are at a high risk of developing diabetes (1,4). The doctor will counsel on non-pharmacological measures which include healthy lifestyle and strict diet to avoid progression to diabetic state (4).

The recommended healthy lifestyle changes include (4):

- Reduction of daily calories
  - Fat
  - Saturated fat
  - Carbohydrates
  - Protein
- Increase fiber intake
- Foods:
  - salad, vegetables, fruits, whole grains, fish high in omega-3 fatty acids, legumes, lean meat
  - minimal intake of refined sugars
- Exercise:
  - moderate-intensity physical activity which includes brisk walking at least 150 minutes per week
- Weight loss:
  - 5 to 7 percent of body weight

In some patient with impaired fasting glucose or impaired glucose tolerance or inconclusive, doctors may also complement non-pharmacological measures with

metformin (4). Metformin has been shown to prevent or delay the onset of diabetes in pre-diabetes, but drug therapy is not as effective as lifestyle intervention (4). Therefore, it should be avoided if possible.

7.2 Type 2 diabetes management

Management of type 2 diabetes is done through non-pharmacological and pharmacological measures.

Non-pharmacological therapy is achieved the same way as for pre-diabetes management involving lifestyle interventions which include diet and exercise.

Pharmacological management.

Type 2 diabetes is managed with the use of one (1) oral antidiabetic medication, followed by a combination of two (2) or more oral medication before insulin is considered.

There are many medications to treat diabetes, but we will focus on **metformin.**

8. Effects of Metformin

Metformin is a medicine used together with diet to lower high blood sugar levels in patients with type 2 diabetes, it is used in other situation too, like gestational diabetes and polycystic ovary syndrome (PCOS). Metformin reduces the amount of sugar that is absorbed from the intestines, lowers the amount of sugar that is produced in the liver, and increases insulin sensitivity (5).

https://post.medicalnewstoday.com/wpcontent/uploads/sites/3/2020/02/320750_2200-1200x628.jpg

When will it start to work?

Metformin does not immediately lower blood sugar levels. Most of the effects take place 4-5 days after taking the drug, however most people notice them within 48 hours of taking it.

What happens if you overdose metformin?

Despite a good safety profile in a most of patients who have diabetes, if safety guidelines are ignored there is a risk of metformin-associated lactic acid (occurs when the body produces too much lactic acid and cannot metabolize it quickly enough) (6).

The **signs and symptoms** of lactic acidosis are severe, appear quickly, and often follow other serious health issues that are unrelated to the medication, such as a heart attack or kidney failure. Lactic acidosis symptoms include stomach or abdominal pain, a loss of appetite, diarrhoea, rapid or shallow breathing, an overall feeling of discomfort, intense muscle pain or cramping, and extreme sleepiness, exhaustion, or weakness (6).

If you experience lactic acidosis symptoms, you should **seek emergency medical attention** immediately.

What happens if you forget to take your medication?

Missing a dose of oral diabetes medications will likely cause an increase in blood sugar level, but the increase will depend on the amount of carbohydrates you ate that day and your exercise levels.

Risk of stopping metformin

- There is a chance that symptoms will get worse if you decide to stop using metformin or any other anti-diabetic drug.
- You need to control your symptoms by sustainable lifestyle changes involving the diet, weight management, and regular exercise (7).
- Untreated high blood sugar level may result in consequences like visual impairment, kidney issues, diabetic nephropathy, nerve damage, heart problems, troubles with sexual health, and foot issues (1,2,8).

9. Metformin side effects.

Common metformin side effects (11).

- Low blood sugar
- Nausea
- Upset stomach
- Diarrhoea

Get emergency medical help if you have signs of an allergic reaction to metformin:

- Skin rash
- Difficult breathing
- Swelling of your face, lips, tongue, or throat.

Get emergency medical help if you have the following mild symptoms:

- Unusual muscle pain.
- Feeling cold.
- Trouble breathing.
- Feeling dizzy, light-headed, tired, or very weak.
- Stomach pain, vomiting.
- Slow or irregular heartbeat.

10. How Metformin should be taken and stored?

- Metformin should be taken with meals to help reduce stomach or bowel side effects that may occur during the first few weeks of treatment.

Non-insulin dependent diabetic adult

- Immediate-release tablet: initially, 500mg once or twice daily or 850mg once daily. Gradually increased if required. maximum dose: 3g/24hr (12).

Drug storage

- Do not store the medication at temperature above 25 ^{0}C.
- Store in the original package. Keep the containers tightly closed (11).

11. Who should not take metformin?

Patients with Kidney disease should not take metformin since they are at a high risk of developing serious and potentially deadly condition called lactic acidosis.

12. Future consultation

- Visit your health care facility to monitor your blood sugar level every 3-6 months, initially then every 6 months once stable.

References

1. Egan, A. M., & Dinneen, S. F. (2019). What is diabetes? In *Medicine (United Kingdom)* (Vol. 47, Issue 1, pp. 1–4). Elsevier Ltd. https://doi.org/10.1016/j.mpmed.2018.10.002
2. Pheiffer, C., Wyk, V. P. van, Turawa, E., Levitt, N., Kengne, A. P., & Bradshaw, D. (2021). Prevalence of type 2 diabetes in South Africa: A systematic review and meta-analysis. In *International Journal of Environmental Research and Public Health* (Vol. 18, Issue 11). MDPI AG. https://doi.org/10.3390/ijerph18115868
3. Ân-Eriksson, B. S. (2000). Type 2 diabetes: symptoms and impact on daily life. An eight-year follow-up study of psychosocial situation and disease development. In *Practical Diabetes Int* (Issue 4).
4. Rao, S. S., Disraeli, P, & McGregor, T. (2004). Impaired Glucose Tolerance and Impaired Fasting Glucose*. American Family Physician* (Vol. 69, issue 8). www.aafp.org/afp.
5. Williams, J. W., Crowley, M. J., Diamantidis, C. J., Mcduffie, J. R., Cameron, B., Stanifer, J., Mock, C. K., Kosinski, A., Wang, X., & Tang, S. (2016). *Metformin Use in Patients with Contraindications or Precautions*.
6. McNamara, K., & Isbister, G. K. (2015). Hyperlactataemia and clinical severity of acute metformin overdose. *Internal Medicine Journal*, *45*(4), 402–408. https://doi.org/10.1111/imj.12713.
7. The Diabetes Prevention Program Research Group. (2003). Effects of Withdrawal From Metformin on the Development of Diabetes in the Diabetes Prevention Program (n.d.). In Diabetes Care (Vol 26, Issue 4). http://diabetesjournals.org/care/article-pdf/26/4/977/659623/dc0403000977.pdf
8. Papatheodorou, K., Banach, M., Edmonds, M., Papanas, N., & Papazoglou, D. (2015). Complications of Diabetes. In *Journal of Diabetes Research* (Vol. 2015). Hindawi Publishing Corporation. https://doi.org/10.1155/2015/189525

9. Sherif, S. (2015). Economic development and diabetes prevalence in MENA countries: Egypt and Saudi Arabia comparison. *World Journal of Diabetes*, *6*(2), 304. https://doi.org/10.4239/wjd.v6.i2.304
10. Popkin, B. M. (2015). Nutrition Transition and the Global Diabetes Epidemic. In *Current Diabetes Reports* (Vol. 15, Issue 9). Current Medicine Group LLC 1. https://doi.org/10.1007/s11892-015-0631-4.
11. NHS. (2022). Side effects of metformin [Internet]. nhs.uk. Available from: https://www.nhs.uk/medicines/metformin/side-effects-of-metformin/
12. Rossiter D., Blockman M., & Barnes K. I. (2016). South African medicines formulary. Erasmuskloof, Pretoria: Health and Medical Publishing Group.