

Diagnosis and management

for patients with diabetes

A noncommunicable disease education manual for primary health care professionals and patients





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The Noncommunicable Disease Education Manual for Primary Health Care Professionals and Patients results from the contributions and hard work of many people. Its development was led by Dr Hai-Rim Shin, Coordinator, and Dr Warrick Junsuk Kim, Medical Officer, of the Noncommunicable Diseases and Health Promotion unit at the WHO Regional Office for the Western Pacific (WHO/WPRO/NCD) in Manila, Philippines.

WHO graciously acknowledges the intellectual contributions of Dr Jung-jin Cho, Co-director, Community-based Primary Care Project Committee and Professor, Department of Family Medicine, Hallym University Sacred Heart Dongtan Hospital, Republic of Korea; Dr Hyejin Lee, Volunteer, WHO/WPRO/NCD (currently PhD candidate, Department of Family Medicine, Seoul National University, Republic of Korea); Ms Saki Narita, Volunteer, WHO/WPRO/NCD (currently PhD candidate, Department of Global Health Policy, Graduate School of Medicine, University of Tokyo, Japan); and Mr Byung Ki Kwon, Technical Officer, WHO/WPRO/NCD (currently Director, Division of Health Promotion, Ministry of Health and Welfare, Republic of Korea).

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Noncommunicable disease education manual for primary health care professionals and patients

Part 1 Prevention and management of hypertension

- Module 1 Diagnosis and management
- Module 2 Healthy lifestyles
- Module 3 Healthy eating habits
- Module 4 Low-salt diet
- Module 5 Physical activity
- Module 6 Medication and management of associated diseases
- Module 7 Complication prevention

Part 2 Prevention and management of diabetes

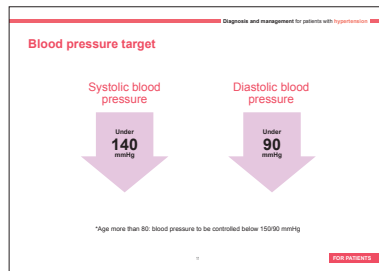
- Module 1 Diagnosis and management** ◀ YOU ARE HERE
- Module 2 Healthy lifestyles
- Module 3 Healthy eating habits 1
- Module 4 Healthy eating habits 2
- Module 5 Physical activity
- Module 6 Taking care of yourself in daily life
- Module 7 Complication prevention

Part 3 Quit smoking

How to use this manual

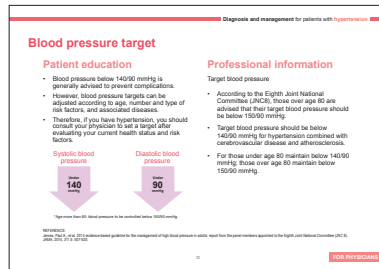
This book is one of fifteen modules of the “Noncommunicable disease education manual for primary health care professionals and patients”. This manual is intended to provide health information on the prevention and control of hypertension and diabetes.

This will be used in the form of a flip chart for health professionals to educate their patients with either hypertension or diabetes.



FOR PATIENTS

On one side of the flip chart is the ‘**For patients**’ page. This side has simple images and key messages that are easy to understand. However, health professionals may need to provide education for patients to fully understand the content.



FOR PHYSICIANS

On the other side of the flip chart is the ‘**For physicians**’ page. This side includes information that the health professional can read out to the patient during counselling. Professional information is also provided for further understanding. A small image of the ‘For patients’ side is included so that the health professional is aware of what the patient is looking at.

This publication is intended to serve as a template to be adapted to national context. Images and graphs that have been watermarked should be replaced with images or graphs that represent the national situation. If assistance is required, or if you have any questions related to the publication, please contact the Noncommunicable Diseases and Health Promotion unit at WHO Regional Office for the Western Pacific (wproncd@who.int).

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What is diabetes?

Diabetes is a metabolic disorder characterized by chronic high blood sugar levels with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both.



What is diabetes?

Patient education

- Diabetes is a state of abnormally high blood sugar levels, resulting from defects in insulin secretion, insulin action, or both.

Diabetes is a metabolic disorder characterized by chronic high blood sugar levels with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both.

Professional information

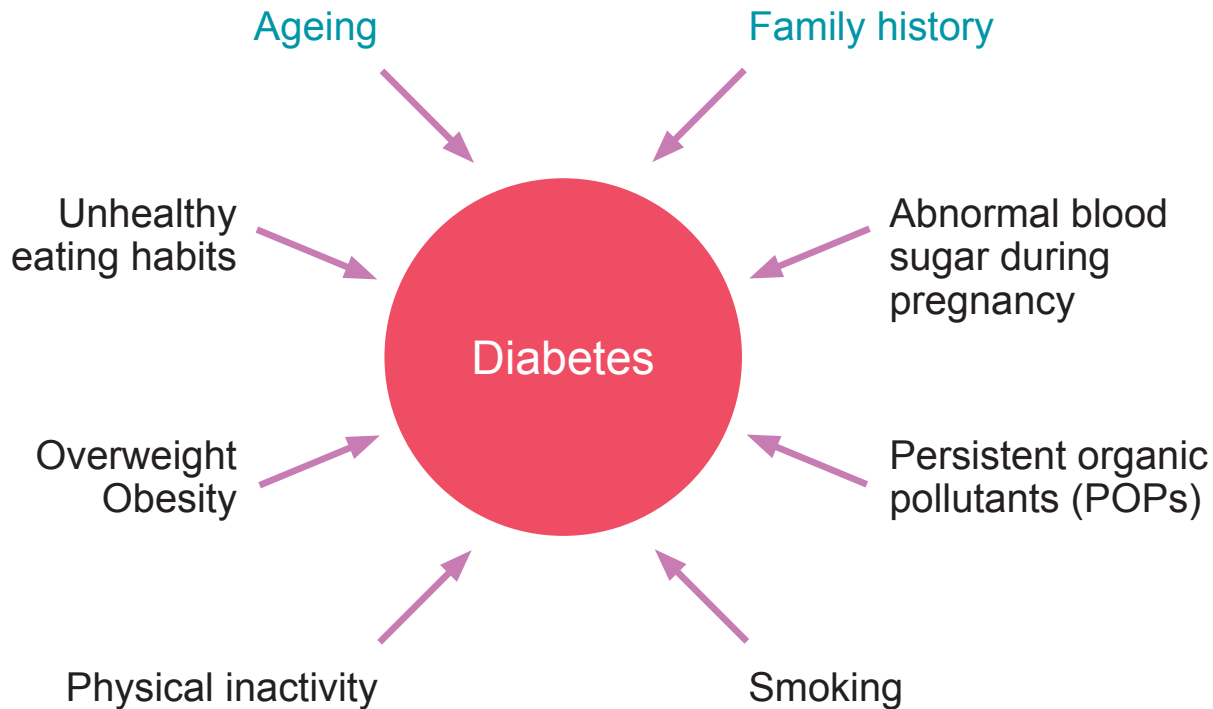
- Major types of diabetes are type 1 diabetes, type 2 diabetes and gestational diabetes.



REFERENCE:

World Health Organization. Definition, diagnosis and classification of diabetes mellitus and its complications. 1999.

Risk factors of type 2 diabetes

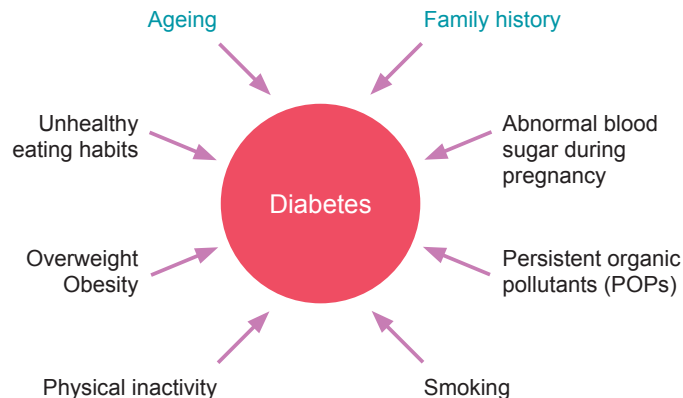


Genetic factors
+
Environmental causes

Risk factors of type 2 diabetes

Patient education

- Diabetes is not caused by a single factor.
- Risk factors for diabetes can be divided into genetic factors and environmental factors.
- If you have a family history of diabetes, you may be at higher risk.
- Environmental factors consist of lifestyle issues, such as the harmful use of alcohol, smoking, physical inactivity, unhealthy diets and overweight/obesity.
- A combination of genetic and unhealthy lifestyle factors all contribute to diabetes.



Genetic factors + Environmental causes

Professional information

- Genetic factors, including insulin resistance and inadequate insulin secretion, are often related to family history.
- This can be explained by a higher concordance rate among monozygotic twins than dizygotic twins.
- There is also a high prevalence of diabetes in certain ethnic groups.
- Modifiable environmental factors are obesity, stress, physical inactivity, pregnancy, infection and drugs (steroids, diuretics, thyroid hormones and antipsychotics).

REFERENCES:

Diabetes basic theory course. Centers for Disease Control and Prevention, Republic of Korea. 2016. (http://www.kncd.org/down/sub09/01/9_1_2_1.pdf, accessed 28 September 2016).
Fauci A. Harrison's Manual of medicine, 18th Edition. McGraw-Hill Professional; 2012.

Symptoms of high blood sugar

Diabetes is usually diagnosed without any symptoms

Symptoms of high blood sugar

Three major symptoms:

frequent urination, increased thirst and fluid intake, increased appetite

General symptoms:

weight loss, fatigue, feeling drowsy after eating

Others symptoms:

blurred vision, itching sensation in the genital area, tongue inflammation, tingling sensation in hands and feet, skin infection



Symptoms of high blood sugar

Patient education

- Not all patients with diabetes experience the same symptoms.
- Most people are diagnosed through health check-ups and have no symptoms.

Diabetes is usually diagnosed without any symptoms

Symptoms of high blood sugar

Three major symptoms:

frequent urination, increased thirst and fluid intake, increased appetite

General symptoms:

weight loss, fatigue, feeling drowsy after eating

Others symptoms:

blurred vision, itching sensation in the genital area, tongue inflammation, tingling sensation in hands and feet, skin infection



REFERENCES:

Diabetes basic theory course. Centers for Disease Control and Prevention, Republic of Korea. 2016. (http://www.kncd.org/download/sub09/01/9_1_2_1.pdf, accessed 28 September 2016).
Fauci A. Harrison's Manual of medicine, 18th Edition. McGraw-Hill Professional; 2012.

Diagnostic criteria of diabetes

Test	Test Condition	Cut-off
Fasting blood sugar	At least eight hours of fasting Can drink pure water	Plasma blood sugar level ≥ 126 mg/dL (7.0mmol/L)
Postprandial blood sugar	With common symptoms such as frequent urination, increased fluid intake and unexplained weight loss	Plasma blood sugar level ≥ 200 mg/dL (11.1 mmol/L)
Oral glucose tolerance test	Test taken two hours after drinking a glucose load after eight hours of fasting	Plasma blood sugar level ≥ 200 mg/dL (11.1 mmol/L)
Glycated haemoglobin (HbA1c)	Does not matter when the test is taken (before or after meals)	Glycated haemoglobin $\geq 6.5\%$

Diagnostic criteria of diabetes

Patient education

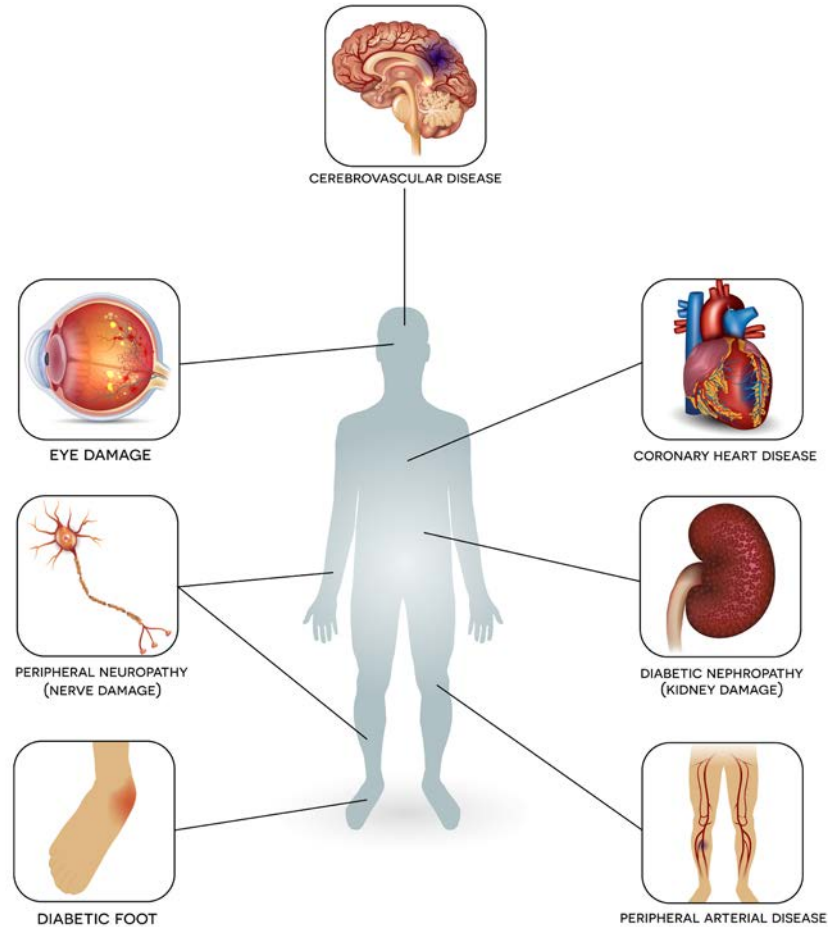
- Diabetes is diagnosed through blood tests.
- Diabetes can be diagnosed when fasting blood sugar level is 126 mg/dL (7.0 mmol/L) or greater in repetitive tests, or if glycated haemoglobin level, which represents the average blood sugar level in the past 2–3 months, is 6.5% or greater.

Test	Test Condition	Cut-off
Fasting blood sugar	At least eight hours of fasting Can drink pure water	Plasma blood sugar level ≥ 126 mg/dL (7.0 mmol/L)
Postprandial blood sugar	With common symptoms such as frequent urination, increased fluid intake and unexplained weight loss	Plasma blood sugar level ≥ 200 mg/dL (11.1 mmol/L)
Oral glucose tolerance test	Test taken two hours after drinking a glucose load after eight hours of fasting	Plasma blood sugar level ≥ 200 mg/dL (11.1 mmol/L)
Glycated haemoglobin (HbA1c)	Does not matter when the test is taken (before or after meals)	Glycated haemoglobin $\geq 6.5\%$

Professional information

- Diabetes is diagnosed when fasting plasma glucose measured after at least eight hours of no caloric intake is 126 mg/dL or above.
- Normal is less than 110 mg/dL and impaired fasting glucose is 110–125 mg/dL.
- Patients with classic symptoms of diabetes (polydipsia, polyuria, unexplained weight loss) have a random plasma glucose of 200 mg/dL or above.
- A two-hour plasma glucose of 200 mg/dL or above after 75 g oral glucose is diagnostic of tolerance test (normal is less than 140, impaired glucose tolerance is 140–199).
- If glycated haemoglobin (HbA1c) is 6.5% or above, diabetes is diagnosed.

Importance of diabetes management: preventing complications



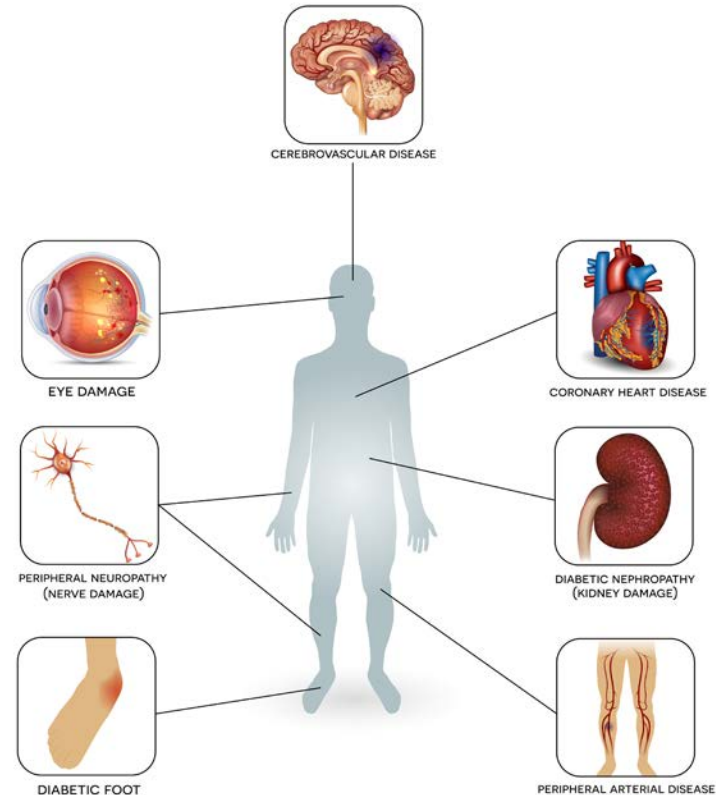
Importance of diabetes management: preventing complications

Patient education

- If you find out that your blood sugar level is high, visit a doctor for treatment as soon as possible.
- Even if you do not have any symptoms, damage to organs is already progressing, which can eventually increase mortality.

Professional information

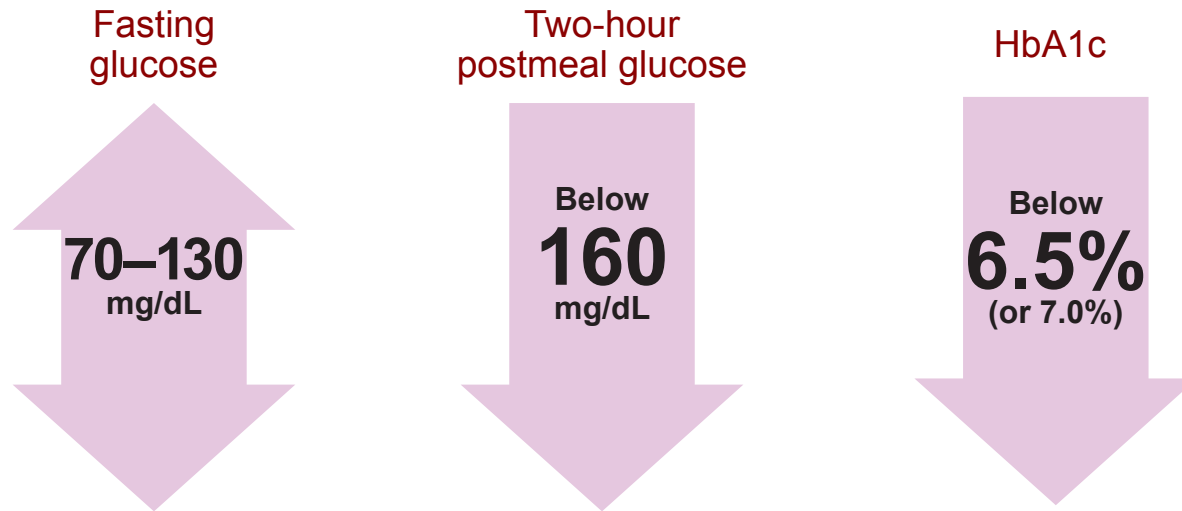
- **Brain:** stroke
- **Heart:** myocardial infarction, angina
- **Blood vessels:** atherosclerosis, dyslipidemia,
- **Kidneys:** chronic kidney disease, renal failure requiring dialysis
- **Eye:** retinopathy, blindness
- **Nerves:** neuropathy (loss of sensation, pain, tingling sensation)
- **Foot:** nerve damage increases the chance for foot ulcers, infection and eventual need for limb amputation
- **Sexual function:** erectile dysfunction



REFERENCE:

Ainsworth, Barbara E., et al. Compendium of physical activities: a second update of codes and MET values. *Medicine and science in sports and exercise*, 2011, 43.8: 1575-1581.

Treatment goals for patients with diabetes



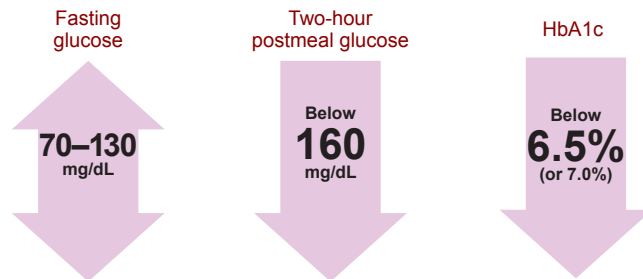
What is HbA1c?

HbA1c represents the average plasma glucose concentration over the past 2–3 months.

Treatment goals for patients with diabetes

Patient education

- The treatment goal for diabetes is a fasting blood sugar level around 110 mg/dL and a postprandial blood sugar level of less than 160 mg/dL.
- HbA1c, which shows the average glucose concentration in the past 2–3 months, should be lower than 6.5%.
- However, these target values may vary, depending on the patient's age, medication type and general condition.



What is HbA1c?

HbA1c represents the average plasma glucose concentration over the past 2–3 months.

Professional information

	HbA1c (%)	Fasting blood glucose	2 hour postprandial blood glucose
American Diabetes Association	< 7.0	70–130	< 180
American Association of Clinical Endocrinologists	≤ 6.5	≤ 110	≤ 140
International Diabetes Federation	≤ 7.0	< 115	≤ 160
Korean Diabetes Association	≤ 6.5	80–120	< 180

REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. *Diabetes Care*, 2015.
 International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Management of diabetes

Eat healthy



Be physically active



Take medicine or insulin regularly



Management of diabetes

Patient education

- Diabetes is commonly referred to as a “lifestyle disease”.
- You cannot alter your genes, however, you can control your blood sugar levels and prevent complications by changing your lifestyle, including losing weight, getting regular exercise, eating less, quitting smoking and relieving stress.
- Diabetes can be managed by eating healthy and exercising regularly in combination with medical treatment.

Eat
healthy



Be physically
active



Take medicine or
insulin regularly



REFERENCE:
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Healthy eating for diabetic patients

- Eat **balanced** meals.
- Eat a **reasonable amount** of calories.
- Eat **regularly** at the right time (do not skip meals to keep your blood sugar level down).
- Eat **slowly**.



Healthy eating for diabetic patients

Patient education

- For diabetic patients, healthy eating does not mean restricting certain types of food.
- Plan a healthy, balanced meal, eat regularly and consume a proper amount of calories.
 - Eat **balanced** meals.
 - Eat a **reasonable amount** of calories.
 - Eat **regularly** at the right time (do not skip meals to keep your blood sugar level down).
 - Eat **slowly**.



Professional information

- All diabetic and pre-diabetic patients should receive individual counselling on healthy eating (recommendation grade I/evidence level A).
- Generally, it is recommended that 50–60% of total caloric intake should be carbohydrates, 15–20% protein and 25% fat.
- However, the proportion of each nutrition group can be individualized depending on the patient's eating habits, preference and goal of treatment (recommendation grade IIb/evidence level D).
- For carbohydrates, a low glycemic index is preferred, including grains, beans, fruit, vegetables and dairy products (recommendation grade IIb/ evidence level B).
- Foods high in unsaturated fats are recommended, while saturated fats or trans fats are not recommended (recommendation grade IIb/evidence level B).

REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. *Diabetes Care*, 2015.

International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

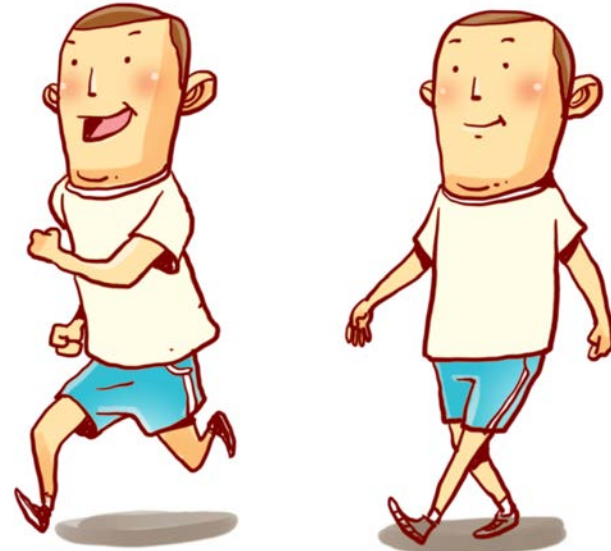
Ohkuma, T., et al. Impact of eating rate on obesity and cardiovascular risk factors according to glucose tolerance status: the Fukuoka Diabetes Registry and the Hisayama Study. *Diabetologia*, 2013, 56.1: 70-77.

Sakurai, Masaru, et al. Self-reported speed of eating and 7-year risk of type 2 diabetes mellitus in middle-aged Japanese men. *Metabolism*, 2012, 61.11: 1566-1571.

Physical activity for patients with diabetes (1)

Start with low intensity, short duration workouts and gradually increase intensity and time.

Restrict physical activity when you have uncontrolled hypertension or complications.



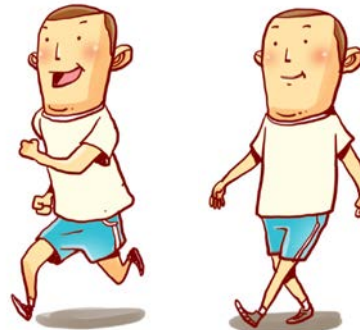
Physical activity for patients with diabetes (1)

Patient education

- It is recommended to start with low intensity, short duration workouts.
- Gradually increasing intensity and duration of exercise is important. Be careful if you already have complications of diabetes.

Start with low intensity, short duration workouts and gradually increase intensity and time.

Restrict physical activity when you have uncontrolled hypertension or complications.



Professional information

- The patient should not rest for more than two consecutive days.
- If the patient has any factors restricting exercise (uncontrolled hypertension, severe peripheral neuropathy, autonomic neuropathy, history of diabetic foot, proliferative diabetic retinopathy), evaluate the risks of exercising, recommend low intensity physical activity and educate patients about possible dangers of exercising.

REFERENCE:
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

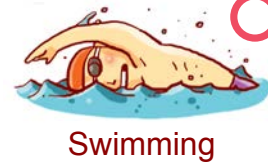
Physical activity for patients with diabetes (2)

For patients without complications:

Aerobic exercise mainly

- More than three days a week.
- Do not rest for more than two consecutive days.

Aerobic



Additional muscle strengthening exercise

- 2–4 times a week

* For patients with complications, recommendations differ according to severity.

Muscle strengthening (weight-bearing)



Should be light enough to lift at least eight times comfortably



Do not lift weights that are too heavy

Physical activity for patients with diabetes (2)

Patient education

- Exercising reduces blood sugar levels, burns calories and helps prevent complications of diabetes. Regular physical activity also helps relieve stress and has a positive effect on mental health.
- Do moderate intensity aerobic exercise for more than 150 minutes per week.
- Exercise at least three times per week, and do not rest for more than two consecutive days.
- Muscle strengthening exercises should be done together 2–4 times per week if there are no other contraindications.

Professional information

- Recommend moderate intensity physical activity (50–70% of maximal heart rate, which is 220 minus age).
- All diabetic patients are recommended to exercise if there are no contraindications. However, depending on the physical state of the patient, intensity and frequency of physical activity must be individualized.
- If there is uncontrolled hypertension, severe peripheral neuropathy, autonomic neuropathy, history of diabetic foot, or proliferative diabetic retinopathy, risk of exercising must be evaluated and certain types of physical activity may need to be avoided.

Aerobic



Muscle strengthening (weight-bearing)



For patients without complications:

Aerobic exercise mainly

- More than three days a week.
- Do not rest for more than two consecutive days.

Additional muscle strengthening exercise

- 2–4 times a week

* For patients with complications, recommendations differ according to severity.

REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. Diabetes Care, 2015.
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Medical treatment for diabetes

- Take your medications exactly as **prescribed by your doctor.**
- Eat meals and take medications regularly at the **right time.**
- Be fully aware of what you should do when you have **hypoglycaemia.**
- Medications must be supported by **healthy eating** and **regular physical activity.** **Quitting smoking** and **stopping harmful use of alcohol** are especially important.



Medical treatment for diabetes

Patient education

- There are many types of diabetes medication, all of which differ in their effect and nature.
- Therefore, direct any questions about your medication to your doctor.
- Patients who are identified as in need of initiation of insulin therapy for long term therapy usually need to be referred to the hospital outpatient department for initiation of insulin, but then can be followed in the health centre.
- Always remember that there is a risk of hypoglycaemia if you delay your meal time, or eat less than usual.
- It is important that you eat regularly, maintain regular physical activity, and take medications as prescribed.
- If you visit other doctors, always inform them that you are taking diabetes medication.



- Take your medications exactly as **prescribed by your doctor**.
- Eat meals and take medications regularly at the **right time**.
- Be fully aware of what you should do when you have **hypoglycaemia**.
- Medications must be supported by **healthy eating** and **regular physical activity**. **Quitting smoking and stopping harmful use of alcohol** are especially important.

Professional information

- It is important to tightly control the patient's blood sugar level to prevent complications.
- Together with lifestyle modifications, diabetes medication must be started as soon as possible (recommendation grade I/evidence level A).
- If 2–3 months of lifestyle modification is not sufficient to reach the blood sugar level goal, medication should be started (recommendation grade I/evidence level A).
- Depending on the patient's blood sugar level profile, early combination therapy can be started (recommendation grade IIa/evidence level B). Insulin therapy can be considered when there are symptoms of diabetes or the HbA1c level is greater than 9% (recommendation grade IIb/evidence level B).

REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. Diabetes Care, 2015
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Take-home message

Diagnosis and management

- **Strict control** of blood sugar levels is needed to **avoid complications**.
- **Medical treatment** must be supported by **healthy lifestyle**.
- **If available, HbA1c** levels should be tested **every 3 months**.
- **If HbA1c is not available, blood sugar levels** must be checked instead.



