



Diabetes

● Objectives :

- 1- list the risk factors for diabetes
- 2- list the complication of diabetes
- 3- Discuss preventive measures within the framework of NCDs
- 4- Screening for diabetes
- 5- Prevention programs in KSA

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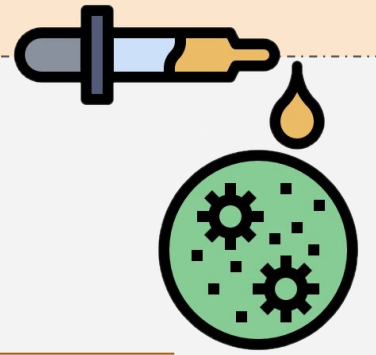
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● Resources :

Slides.

Doctor's notes.

Epidemiology



- The studies demonstrated varying prevalence rates in different geographical regions in the country, ranging from 18.2% (in 2004± 2005) in the study conducted in the Eastern province to 31.6% in 2011 in the study conducted in Riyadh.

Classification of diabetes

Type 1 diabetes
(due to autoimmune β -cell destruction, usually leading to absolute insulin deficiency)

Type 2 diabetes
(due to a progressive loss of β -cell insulin secretion frequently on the background of insulin resistance)

Gestational diabetes mellitus (GDM) (diabetes diagnosed in the second or third trimester of pregnancy that was not present prior to gestation)

Specific types of diabetes due to other causes, e.g. maturity-onset diabetes of the young [MODY], and drug induced diabetes (such as with glucocorticoid use,)

Criteria for the diagnosis

diabetes

- ✓ **FPG: 126 mg/dL (7.0 mmol/L).** Fasting for at least 8 h.
- ✓ **OR 2-h PP: 200 mg/dL (11.1 mmol/L).**
- ✓ **OR A1C: 6.5%.**
- ✓ **OR** In a patient with classic symptoms of hyperglycemia and a random plasma glucose 200 mg/dL (11.1 mmol/L). **One reading is enough for symptomatic patients**
- ✓ In the absence of unequivocal hyperglycemia, diagnosis requires **two abnormal test results** from the same sample or in two separate test samples. (2 FPG / 2 A1C / FPG and A1C/ FPG and 2hpp) **e.g. the patient is coming due to their high blood pressure or a regular routine check up and you discovered their hyperglycemia**

You should know the values.

Criteria for the diagnosis

prediabetes even prediabetic patients have to be tested twice.

You should know the values.

- ✓ Normal Fasting Plasma Glucose: 5.5 mmol/L (99 mg/dL)
- ✓ Prediabetes; Fasting Plasma Glucose: 5.6 – 6.9 mmol/L (100 - 125 mg/dL)
- ✓ Prediabetes; A1C: 5.7 – 6.4%
- ✓ The person is at risk to develop diabetes mellitus
- ✓ How do we know whether this pre-diabetic patient will become diabetic or not? By testing their FPG first then giving them a 75g of glucose and test their glucose level again after 2 hours of the minute they started eating. If their results are still below then their still pre-diabetic

Criteria for testing for diabetes in asymptomatic adults

1. Testing should be considered in overweight or obese adults who have one or more of the following risk factors:

- a. First-degree relative with diabetes
- b. **History of CVD or Hypertension**
- c. Women with polycystic ovary syndrome
- d. Physical inactivity
- e. Conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)

2. Patients with prediabetes should be tested yearly.

3. Women who were diagnosed with GDM.

4. For all other patients, testing should begin at age 45 years.

5. If results are normal, testing should be repeated at a minimum of 3-year intervals

Used for screening

Are you at risk for type 2 diabetes?

Diabetes Risk Test:

WRITE YOUR SCORE IN THE BOX.

1. How old are you?	<input type="text"/>	Height	Weight (lbs.)
Less than 40 years (0 points)		4' 10"	119-142 143-190 191+
40-49 years (1 point)		4' 11"	124-147 148-197 198+
50-59 years (2 points)		5' 0"	128-152 153-203 204+
60 years or older (3 points)		5' 1"	132-157 158-210 211+
		5' 2"	136-163 164-217 218+
2. Are you a man or a woman?	<input type="text"/>	5' 3"	141-168 169-224 225+
Man (1 point) Woman (0 points)		5' 4"	145-173 174-231 232+
3. If you are a woman, have you ever been diagnosed with gestational diabetes?	<input type="text"/>	5' 5"	150-179 180-239 240+
Yes (1 point) No (0 points)		5' 6"	155-185 186-246 247+
4. Do you have a mother, father, sister or brother with diabetes?	<input type="text"/>	5' 7"	159-190 191-254 255+
Yes (1 point) No (0 points)		5' 8"	164-196 197-261 262+
5. Have you ever been diagnosed with high blood pressure?	<input type="text"/>	5' 9"	169-202 203-269 270+
Yes (1 point) No (0 points)		5' 10"	174-208 209-277 278+
6. Are you physically active?	<input type="text"/>	5' 11"	179-214 215-285 286+
Yes (0 points) No (1 point)		6' 0"	184-220 221-293 294+
7. What is your weight category?	<input type="text"/>	6' 1"	189-226 227-301 302+
See chart at right.		6' 2"	194-232 233-310 311+
		6' 3"	200-239 240-318 319+
		6' 4"	205-245 246-327 328+

1 point 2 points 3 points

If you weigh less than the amount in the left column: 0 points

Adapted from Bang et al., Ann Intern Med 151:775-783, 2009 • Original algorithm was validated without gestational diabetes as part of the model.

If you scored 5 or higher:

You are at increased risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes, a condition in which blood glucose levels are higher than normal but not yet high enough to be diagnosed as diabetes. Talk to your doctor to see if additional testing is needed.

Type 2 diabetes is more common in African Americans, Hispanics/Latinos, Native Americans, Asian Americans, and Native Hawaiians and Pacific Islanders.

Higher body weight increases diabetes risk for everyone. Asian Americans are at increased diabetes risk at lower body weight than the rest of the general public (about 15 pounds lower).

Learn more at diabetes.org/risktest | 1-800-DIABETES (800-342-2383)

Lower Your Risk

The good news is you can manage your risk for type 2 diabetes. Small steps make a big difference in helping you live a longer, healthier life.

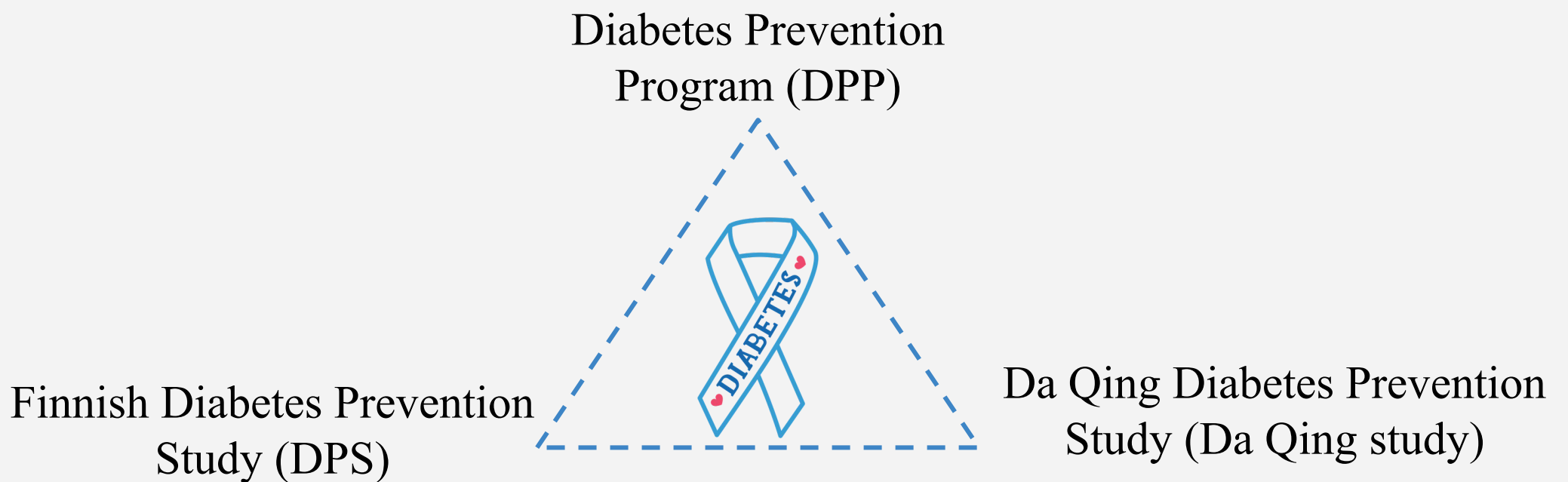
If you are at high risk, your first step is to visit your doctor to see if additional testing is needed.

Visit diabetes.org or call 1-800-DIABETES (800-342-2383) for information, tips on getting started, and ideas for simple, small steps you can take to help lower your risk.

Figure 2.1—ADA risk test (diabetes.org/socrisktest).

Prevention or delay development of diabetes

- The Diabetes Prevention Program Several major randomized controlled trials, including:



- All demonstrated that lifestyle/ behavioral therapy featuring an individualized reduced calorie meal plan is highly effective in preventing type 2 diabetes and improving other cardiometabolic markers (such as blood pressure, lipids, and inflammation).
- The **strongest evidence** for diabetes prevention comes from the **DPP** trial (1). The DPP demonstrated that an intensive lifestyle intervention could reduce the incidence of type 2 diabetes by 58% over 3 year
- Our most important priority is prevention in pre-diabetic patient from becoming diabetic and prevention of diabetes complications in diabetic patients

LIFESTYLE INTERVENTIONS

- Refer patients with prediabetes to an intensive behavioral lifestyle intervention program.
- Based on the Diabetes Prevention Program (DPP) to achieve PREVENTION OR DELAY OF TYPE 2 DIABETES and maintain 7 - 10% loss of initial body weight and increase moderate-intensity physical activity (such as brisk walking) to at least 150 min/week. (Evidence: A)
 - Brisk walk هرولة أو مشي سريع is the minimum physical activity for at least 30 minutes 5 days a week

Healthy nutrition

Encourage: **very important**

- Whole grains, legumes, nuts, fruits, vegetables, **and meat with no fat**
- Minimize; refined and processed foods, like rice, white bread, sugary drinks,
- The use of nonnutritive sweeteners may have the potential to reduce overall calorie and carbohydrate intake if substituted for caloric (sugar) sweeteners.
- **Low glycemic index diet is a must**
- A referral to dietitian is essential to assess the overall nutrition status of, and to work collaboratively with, the patient to create a personalized meal plan that considers the individual's health status, skills, resources, food preferences, and health goals to coordinate and align with the overall treatment plan including physical activity and medication.

Physical activity and tobacco cessation

- Just as **150 min/week** of moderate intensity physical activity, such as **brisk walking**, showed beneficial effects in those with prediabetes.
- Moderate intensity physical activity has been shown to **improve insulin sensitivity and reduce abdominal fat**.
- **Physical activity is very important bc it plays a protective role against cardiovascular diseases, dyslipidemia, hypertension and breast cancer**
- Tobacco Smoking may increase the risk of type 2 diabetes; therefore, evaluation for tobacco use and referral for tobacco cessation, if indicated, should be part of routine care for those at risk for diabetes.
- **Don't forget to ask about smoking history!**



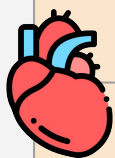
To understand the next slide:

(A) means that the evidence supporting this statement is very strong while

(B) means that the evidence aren't as strong as (A) but still strong

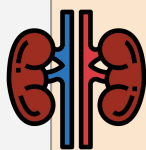
Complications of DM

Cardiovascular Disease (CVD)



- After 10 years of observational follow-up of the **UKPDS**, those originally randomized to intensive glycemic control had significant long-term **reductions in MI** (15% with sulfonylurea or insulin as initial pharmacotherapy, **33% with metformin** as initial pharmacotherapy) and in **all-cause mortality** (13% and 27%, respectively).
- DM increase risk of **CVD**

Chronic kidney disease (CKD)



- **Optimize glucose control** to reduce the risk or slow the progression of chronic kidney disease. A
- **Optimize blood pressure control** to reduce the risk or slow the progression of chronic kidney disease. A
- ☐ **Screening for Chronic kidney disease(CKD):**
- ☐ **Albumin/Creatinine Ratio** to detect **Microalbuminuria** beside **Renal function tests**.
- ☐ ACR is routine & essential test not optional.
- ☐ ACR requested for DM1 after 5 years of Dx, but for DM2 in the 1st or 2nd visit.
- ☐ ACR requested for diabetic Pt 1time/year if he's controlled, 2-4times/year if he's uncontrolled.

Diabetic Retinopathy



- **Optimize glycemic control** to reduce the risk or slow the progression of diabetic retinopathy. A
- **Optimize blood pressure and serum lipid control** to reduce the risk or slow the progression of diabetic retinopathy. A
- ☐ **Screening for Diabetic Retinopathy:**
- ☐ Adults with type 1 diabetes should be referred to an ophthalmologist within **5 years after** the onset of diabetes. B
- ☐ Patients with type 2 diabetes should be referred to an ophthalmologist **at the time** of the diabetes diagnosis. B
- ☐ **Prediabetic should be referred to dietitian only but Diabetic should be referred to dietitian and ophthalmologist.**

Neuropathy



- ☐ **Screening for Neuropathy: (lower limb examination)**
- ☐ All patients should be assessed for diabetic peripheral neuropathy **starting at diagnosis** of type 2 diabetes and **5 years after** the diagnosis of type 1 diabetes and at least annually thereafter. B

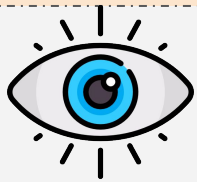
Foot care & Diabetic foot

- Perform a comprehensive foot evaluation at least annually to identify risk factors for ulcers and amputations. B
- The examination should include inspection of the skin, assessment of foot deformities, neurological assessment (monofilament testing with pinprick, temperature, vibration), and vascular assessment including pulses in the legs and feet. B
- **Check for fungal infection between the toes**

Pharmacologic Interventions

- **Metformin** therapy for prevention of type 2 diabetes should be considered in those with prediabetes, especially for those who are obese.
- **Metformin** and **intensive lifestyle modification** led to an equivalent **50%** reduction in diabetes risk.
- Metformin is giving for all type 2 DM who aren't suffering from any abnormal renal or liver functions
 - A patient was diagnosed with DM type 2 where his HbA1c was 13.4% and his glucose levels were 360 mg/dL, after 3 only months of starting him on metformin and advising him to do lifestyle modifications his HbA1c became 7.6% which is a huge improvement

Referral of diabetic patients



To Eye Clinic:

(DM type 2 “first visit” and DM type 1 “after 5 years of diagnosis.)

To Dietitian:

For all.

To Diabetic Educator:

when start insulin or shift to Penfill injections.

To Specialty Clinics:

like nephrology and **cardiovascular** when indicated

- **Multidisciplinary approach** for DIABETIC PATIENTS (Physician, clinical pharmacist, health educator and nutritionist)
- All patients on insulin will be offered a **Glucometer for home monitoring.**

Prevention / Health Services in Saudi Arabia

Specialized Centers:

The Ministry of Health (MOH) adopted implementing an objective method in all the fields of health services providing: prevention, treatment, and rehabilitation, through a network of integrated facilities.

- Thus, it established 20 specialized centers for treating diabetics, and eight new more centers are underway across the Saudi Arabia's regions.
- Further, the MOH is working on enhancing the health awareness of each diabetic or anyone vulnerable to develop the disease, and providing the best health and education services.

The National Executive Plan Includes Seven Objectives

- **First Objective:** the primary prevention from the second type of diabetes, and diminishing incidence rates of the disease through addressing the risk factors causing the disease.

- **Second Objective:** secondary prevention from the second type of diabetes through the early detection of the disease and its complications.

- **Third Objective:** advancing quality of the health services delivered to the patients suffering from diabetes and its complications.

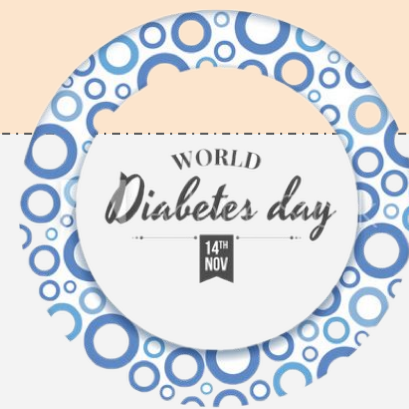
- **Fourth Objective:** developing ways of detecting and following up, and assessing patients through Diabetics' Registration Program, extent of adherence to the work quality levels, annual follow-up registers, patients' interviews, and healthcare registers of patients.

- **Fifth Objective:** improving on the research tools and studies related to the disease.

- **Sixth Objective:** enabling diabetics and their families to contribute to controlling diabetes and its complications.

- **Seventh Objective:** community participation in controlling diabetes.

World Diabetes Day



- The Ministry of Health (MOH) is interested annually in marking the World Diabetes Day, falling on the fourteenth of November of each year.
- This is with the aim of achieving the general goals in terms of boosting up and carrying out the prevention policies and controlling diabetes and its complications.
- Supporting the national initiatives for diabetes control and its complications, and highlighting the importance of evidence-based education with regard to treating diabetes and preventing from its complications.

National Preventive Programs

- The cornerstone of a national preventive program would be the PHCCs. However, quality of care at the PHCCs is unsatisfactory.
- A comprehensive review of primary healthcare in Saudi Arabia found that access to health education was limited and referrals to specialist hospitals were low.
- Patients' follow-up system was ineffective.
- Multiple problems with poor quality and time for health education, poor counseling, lack of trust in health-care providers, and difficulty in understanding instructions from health providers due to poor communication.
- **Education** is very important especially in **pre-diabetic** patients about the lifestyle modification they have to undergo in order to prevent diabetes from occurring
- Our aim objective once the patient is diagnosed with diabetes is preventing the complications

MCQs

1- Which of the following statements is correct?

- a) Insulin suppresses the activity of glycogen synthase
- b) Insulin mediates glucose uptake in the brain
- c) "Pre-diabetes" is characterized by an increased risk for the future development of type 2 diabetes
- d) The rise in insulin concentration after meal ingestion is reduced in type 1 but not in type 2 diabetes

2- The risk factors for type 2 diabetes mellitus include:

- a) family history
- b) being overweight
- c) high intake of dietary fat
- d) All of the options listed are correct

3- The pathogenesis of hyperglycemia in type 2 diabetes includes all the following mechanisms except for:

- a) Increased glucose production by the liver
- b) Impaired insulin secretion
- c) Decreased glucose uptake from the skeletal muscle
- d) All of the options given are correct

4- The test for checking mean plasma glucose concentration over the previous 8-10 weeks is:

- a) Hemoglobin A1c
- b) Oral glucose tolerance test (OGTT)
- c) Fructosamine test
- d) Fasting plasma glucose concentration

5- According to trials on diabetes prevention, high-risk individuals can reduce their risk to develop diabetes by doing the following:

- a) Eating a very low carbohydrate diet
- b) Consuming a diet high in monounsaturated fats
- c) Losing 5-7% of body weight through a hypocaloric low fat diet and 30 minutes of daily activity
- d) Initiating metformin 850 mg BID and practicing daily vigorous exercise

6- What is the first-line drug for patients with type 2 diabetes and obesity?

- a) Acarbose
- b) Metformin
- c) Sulphonylureas
- d) Insulin

Answers:
1 - C
2 - D
3 - D
4 - A
5 - C
6 - B