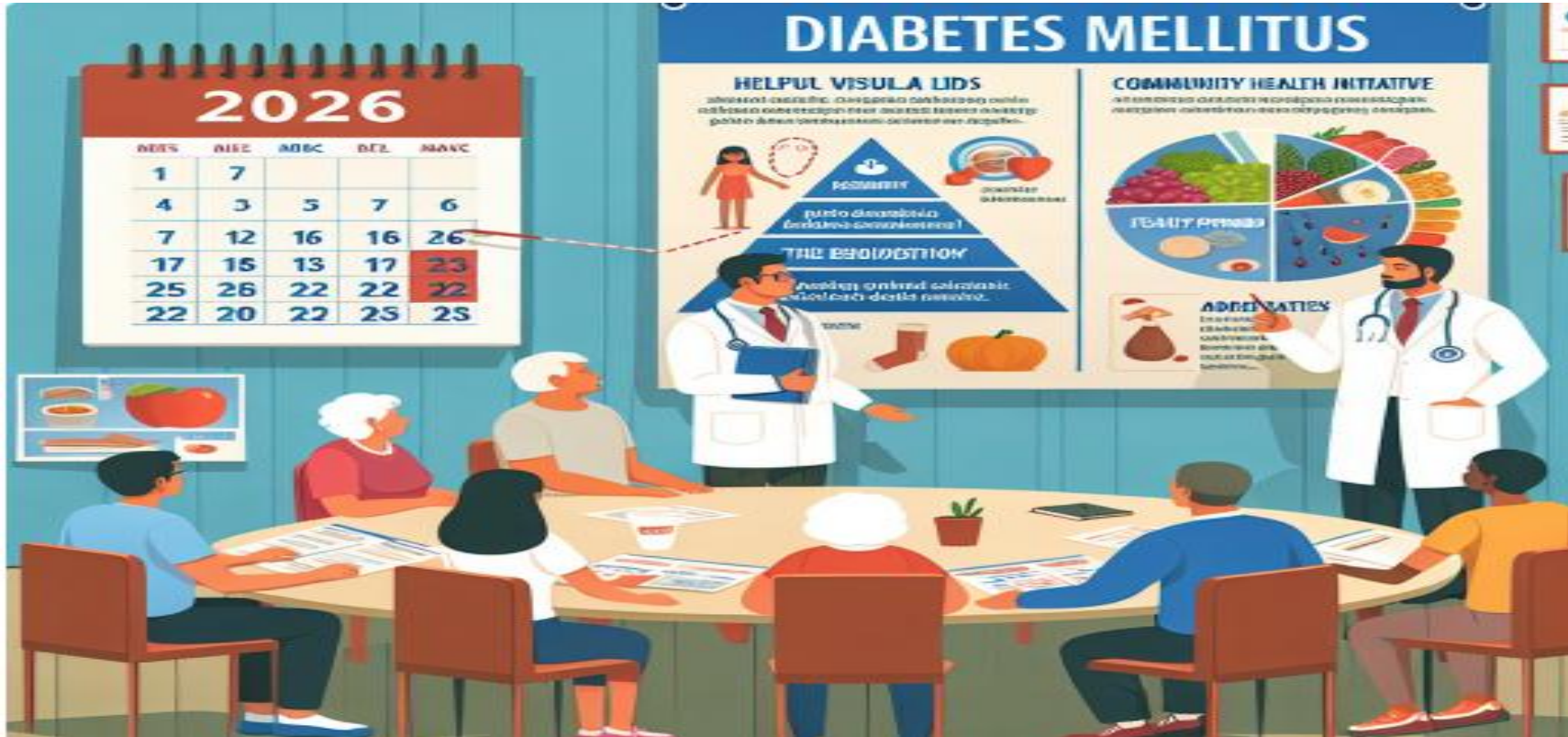


FAMILY AND COMMUNITY MEDICINE EPIDEMIOLOGY OF DIABETES MELLITUS- 2026

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LEARNING OBJECTIVES

- ◉ Understand diabetes epidemiology globally and in Iraq
- ◉ Examine pathophysiology of T1D, T2D, and prediabetes
- ◉ Review ADA 2026 diagnostic criteria
- ◉ Discuss prevention and public health strategies

1 in 10 people are living with diabetes

IDF's mission is to improve the lives of people living with diabetes and prevent diabetes in those at risk.

[Learn about diabetes](#)

[View the latest data](#)

540
million
people live with
diabetes

WHAT IS DIABETES MELLITUS?

- ⦿ Chronic metabolic disorder with hyperglycemia
- ⦿ Caused by defects in insulin secretion/action
- ⦿ Affects carbohydrate, fat, and protein metabolism
- ⦿ Leads to long-term complications if untreated
- ⦿

CLASSIFICATION OF DIABETES (ADA 2026)

- Type 1 Diabetes (T1D): Autoimmune β -cell destruction
- Type 2 Diabetes (T2D): Insulin resistance + β -cell dysfunction
- Gestational Diabetes Mellitus (GDM)
- Other specific types (genetic, drug-induced)
- Prediabetes: Elevated glucose below diabetes threshold

Type 1 diabetes



- Lack of insulin
- Autoimmune
- Usually children

Type 2 diabetes



- Insulin resistance
- Lifestyle factors
- Usually adults

Gestational diabetes

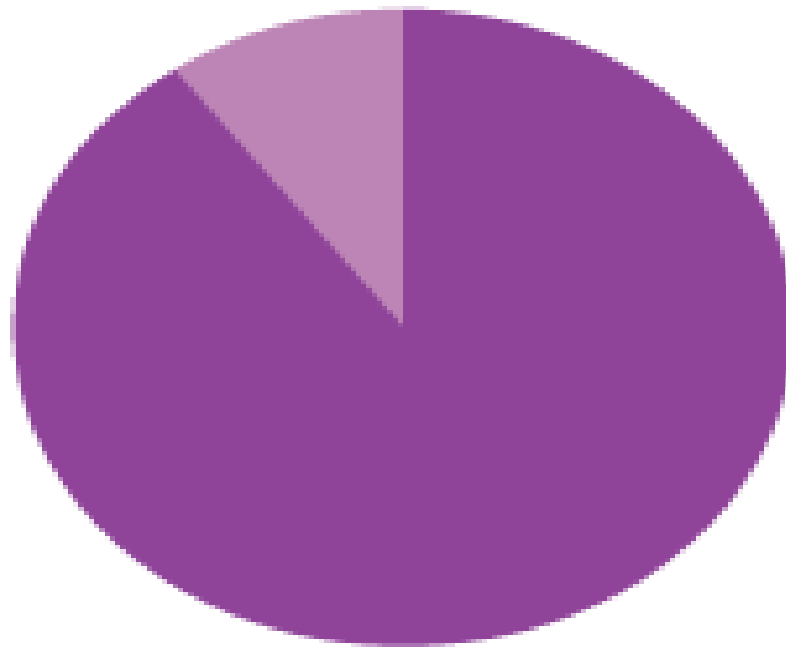


- Insulin resistance
- During pregnancy
- Risks to mother and child

90% to 95%

of all diabetes cases are type 2.

Type 1 Diabetes



Type 2 Diabetes

DIAGNOSIS

Table 2.1—Criteria for the diagnosis of diabetes in nonpregnant individuals

A1C $\geq 6.5\%$ (≥ 48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*

OR

FPG ≥ 126 mg/dL (≥ 7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*

OR

2-h PG ≥ 200 mg/dL (≥ 11.1 mmol/L) during OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

OR

In an individual with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥ 200 mg/dL (≥ 11.1 mmol/L). Random is any time of the day without regard to time since previous meal.

DCCT, Diabetes Control and Complications Trial; FPG, fasting plasma glucose; OGTT, oral glucose tolerance test; NGSP, National Glycohemoglobin Standardization Program; WHO, World Health Organization; 2-h PG, 2-h plasma glucose. *In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal results from different tests, which may be obtained at the same time (e.g., A1C and FPG), or the same test at two different time points.

EPIDEMIOLOGICAL DETERMINANTS

1. AGENT

The underlying cause of diabetes is insulin deficiency which is absolute in type 1 diabetes and partial in type 2 diabetes.

This may be due to a wide variety of mechanisms:

(a) Pancreatic disorders - inflammatory, neoplastic and other disorders such as cystic fibrosis.

(b) Defects in the formation of insulin, e.g synthesis of an abnormal, biologically less active insulin molecule.

(c) Destruction of beta cells, e.g., viral infections and chemical agents.

(d) Decreased insulin sensitivity, due to decreased numbers of adipocyte and monocyte insulin receptors.

(e) Genetic defects, e.g., mutation of insulin gene.

(f) Autoimmunity

2. HOST FACTORS

(A) AGE

Although diabetes may occur at any age, surveys indicate that prevalence rises steeply with age.

Type 2 diabetes usually comes to light in the middle years of life and thereafter begins to rise in frequency. Malnutrition-related diabetes affects a large number of young people.

The prognosis is worse in younger diabetics who tend to develop complications earlier than older diabetics.

(B) SEX

In some countries, the overall male-female ratio is about equal.

In south-east Asia, an excess of male diabetics has been observed.

(C) GENETIC FACTORS:

- ◎ Twin studies showed that in identical twins who developed type 2 diabetes, concordance was approximately 90 percent; thus, demonstrating a strong genetic component.**
- ◎ In type 1 diabetes, the concordance was only about 50 percent indicating that type 1 diabetes is not totally a genetic entity.**

(D) GENETIC MARKERS

- ◉ **Type 1 diabetes is associated with HLA-B8 and B15, and more powerfully with HLA-DR3 and DR4.**
- ◉ **The highest risk of type 1 diabetes is carried by individuals with both DR3 and DR4.**
- ◉ **Type 2 diabetes is not HLA-associated.**

(E) IMMUNE MECHANISMS

- ⊙ There is some evidence of both cell-mediated and humoral activity against islet cells.**
- ⊙ Some people appear to have defective immunological mechanisms and under the influence of some environmental "trigger", attacks their own insulin-producing cells.**

(F) OBESITY

- ◉ **Obesity particularly central adiposity has long been accepted as a risk factor for type 2 diabetes and the risk is related to both the duration and degree of obesity.**
- ◉ **The association has been repeatedly demonstrated in longitudinal studies in different populations, with a striking gradient of risk apparent with increasing levels of BMI, adult weight gain, waist circumference, or waist-to-hip ratio.**



- ⊙ **Waist circumference or waist-to-hip ratio (reflecting abdominal or visceral adiposity) are more powerful determinants of subsequent risk of type 2 diabetes than BMI**
- ⊙ **Central obesity is also an important determinant of insulin resistance, the underlying abnormality in most cases of type 2 diabetes.**
- ⊙ **In some instances, obesity reduces the number of insulin receptors on target cells.**

TABLE 4.3. CRITERIA FOR WAIST CIRCUMFERENCE IN ADULTS

RISK CATEGORY	WAIST CIRCUMFERENCE cm (IN)	
	WOMEN	MEN
Very low	<70 cm (27.5 in)	<80 cm (31.5 in)
Low	70-89 (28.5-35.0)	80-99 (31.5-39.0)
High	90-109 (35.5-43.0)	100-120 (39.5-47.0)
Very high	>110 (43.5)	>120 (47.0)

Waist-to-Hip Ratio (WHR) Norms

Gender	Excellent	Good	Average	At Risk
Males	<0.85	0.85-0.89	0.90-0.95	≥0.95
Females	<0.75	0.75-0.79	0.80-0.86	≥0.86

OBESITY



**TYPE 2
DIABETES**



- ◉ **Voluntary weight loss improves insulin sensitivity and in several randomized controlled trials has been shown to reduce the risk of progression from impaired glucose tolerance to type 2 diabetes.**
- ◉ **However, many obese subjects are not diabetic.**
- ◉ **Thus, obesity by itself is inadequate to account for all, or even most, cases of type 2 diabetes; physical inactivity and/or deficiencies of specific nutrients may also be involved.**
- ◉ **Obesity appears to play no role in type 1 diabetes pathogenesis**

(G)MATERNAL DIABETES



- ◉ **Offsprings of diabetic pregnancies including gestational diabetes are often large and heavy at birth, tend to develop obesity in childhood, and are at high risk of developing type 2 diabetes at an early age.**
- ◉ **Those born to mothers after they have developed diabetes have a three-fold higher risk of developing diabetes than those born before.**
- ◉ **Maternal diabetes associated with intrauterine growth retardation and low birth weight, when associated with rapid growth catch-up later on, appears to increase the risk of subsequent diabetes in the child**

3. ENVIRONMENTAL RISK FACTORS

(A) SEDENTARY LIFESTYLE :

Lack of exercise may alter the interaction between insulin and its receptors and subsequently lead to type 2 diabetes---OBESITY MAY RESULT



(B) DIET



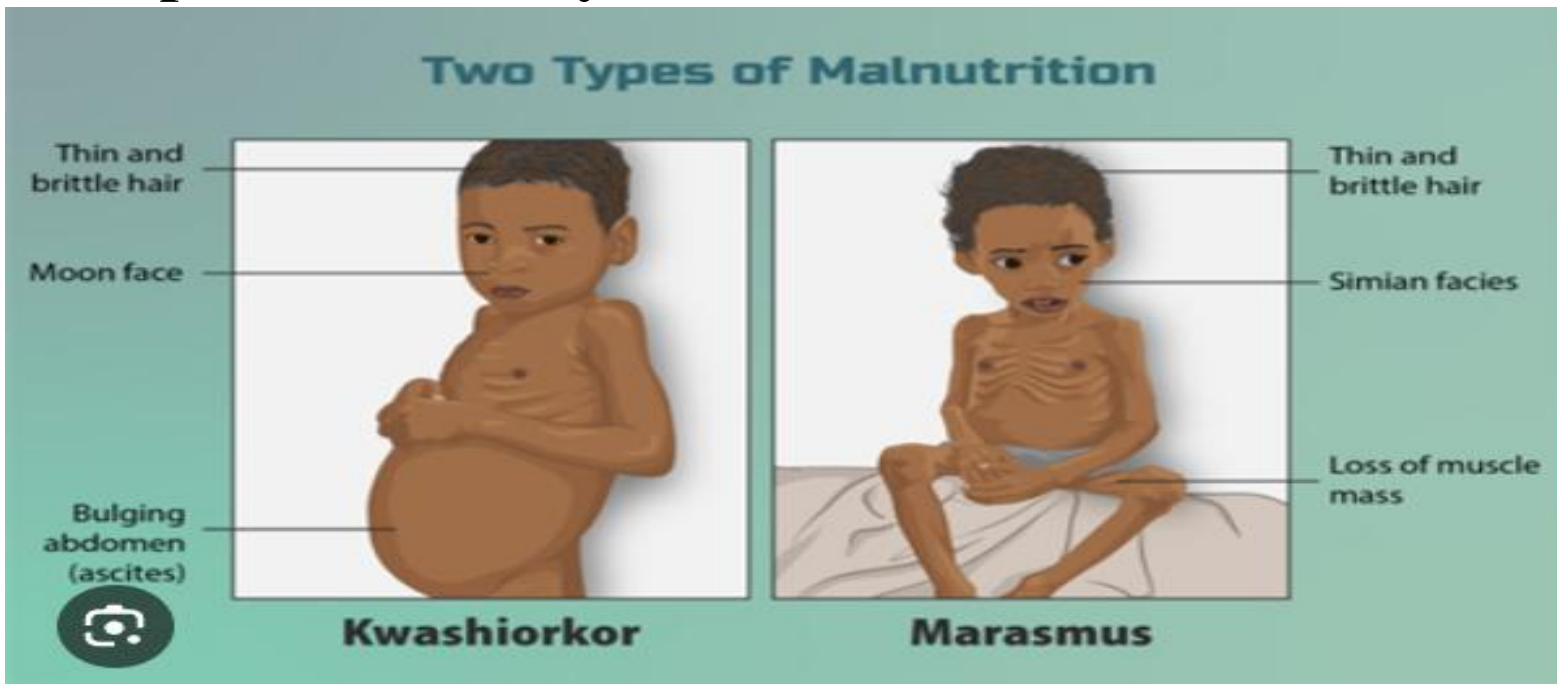
- ⦿ **A high saturated fat intake has been associated with a higher risk of impaired glucose tolerance, and higher fasting glucose and insulin levels.**
- ⦿ **Higher proportions of saturated fatty acids in serum lipid or muscle phospholipid have been associated with higher fasting insulin, lower insulin sensitivity, and a higher risk of type 2 diabetes.**

- ⦿ **Higher unsaturated fatty acids from vegetable sources and polyunsaturated fatty acids have been associated with reduced risk of type 2 diabetes and lower fasting and 2-hour glucose concentrations.**
- ⦿ **Higher proportions of long-chain polyunsaturated fatty acids in skeletal muscle phospholipids have been associated with increased insulin sensitivity.**

- ⊙ **In human intervention studies, the replacement of saturated by unsaturated fatty acids leads to improved glucose tolerance and enhanced insulin sensitivity.**
- ⊙ **long-chain polyunsaturated fatty acids do not appear to confer additional benefits over monounsaturated fatty acids.**
- ⊙ **When total fat intake is high (greater than 37 percent of total energy), altering the quality of dietary fat appears to have little effect.**

(D) MALNUTRITION

- Protein-energy malnutrition ‘in early infancy and childhood may result in partial failure of β -cell function.
- Damage to Beta cells may well explain the associated impaired carbohydrate tolerance in kwashiorkor.



(E) ALCOHOL

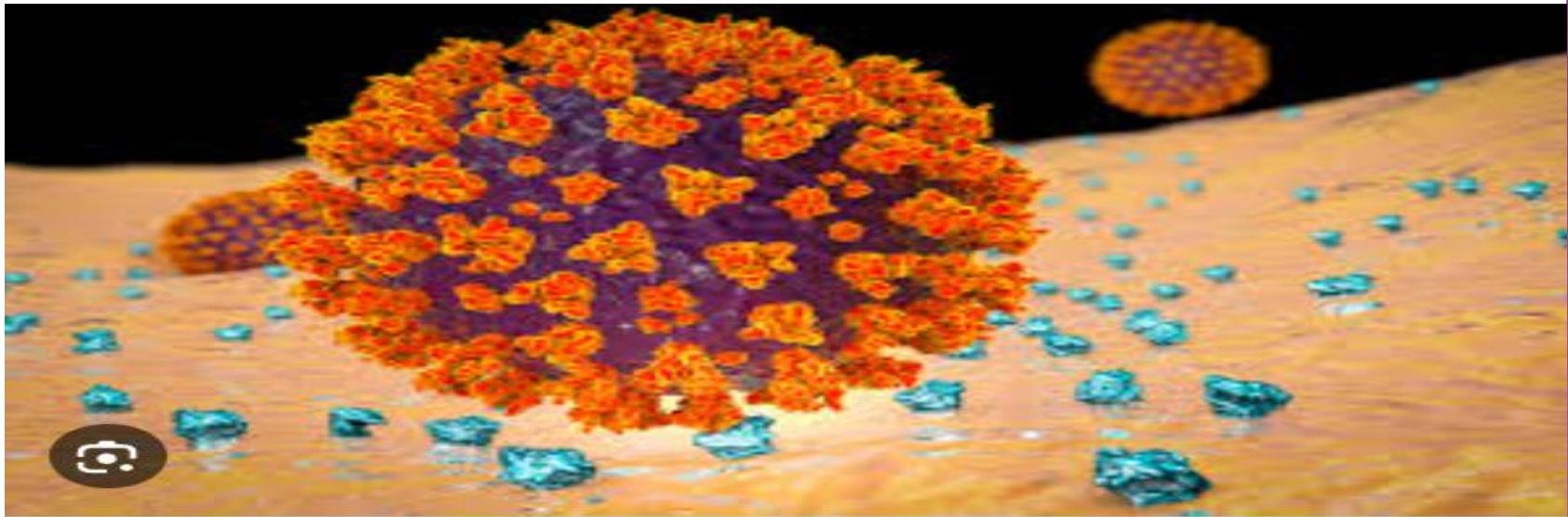
Excessive intake of alcohol can increase the risk of diabetes by

- ⊙ damaging the pancreas and liver**
- ⊙ Increase obesity.**

(F) VIRAL INFECTIONS:

Among the viruses that have been implicated are rubella, mumps, and human coxsackie virus B4.

Viral infections may trigger in immunogenetically susceptible people a sequence of events resulting in \sim -cell destruction.



(G) CHEMICAL AGENTS

- ⦿ Chemical agents are known to be toxic to beta cells, e.g., alloxan, streptozotocin, the rodenticide VALCOR, etc.**
- ⦿ A high intake of cyanide-producing foods (e.g., cassava and certain beans) may also have toxic effects on B-cells.**

(H) STRESS

Surgery, trauma, and stress of situations, internal or external, may “bring out” the disease.



EPIDEMIOLOGICAL DATA

The Diabetes Atlas further breaks down the global prevalence of diabetes according to regions. Here's the global burden as of 2021:

- **North America and the Caribbean:** 51 million
- **Europe:** 61 million
- **Middle East and North Africa:** 73 million
- **Africa:** 24 million
- **South and Central America:** 32 million
- **South East Asia:** 90 million
- **Western Pacific:** 206 million

IT WAS EVIDENT THAT LOW AND MIDDLE-INCOME COUNTRIES AND REGIONS HAD THE HIGHEST PREVALENCE OF DIAGNOSED DIABETES. MORE SPECIFICALLY, ABOUT 3 IN 4 ADULTS WITH DIABETES LIVE IN LOW AND MIDDLE-INCOME COUNTRIES.

IRAQ-LAST UPDATE: 2022



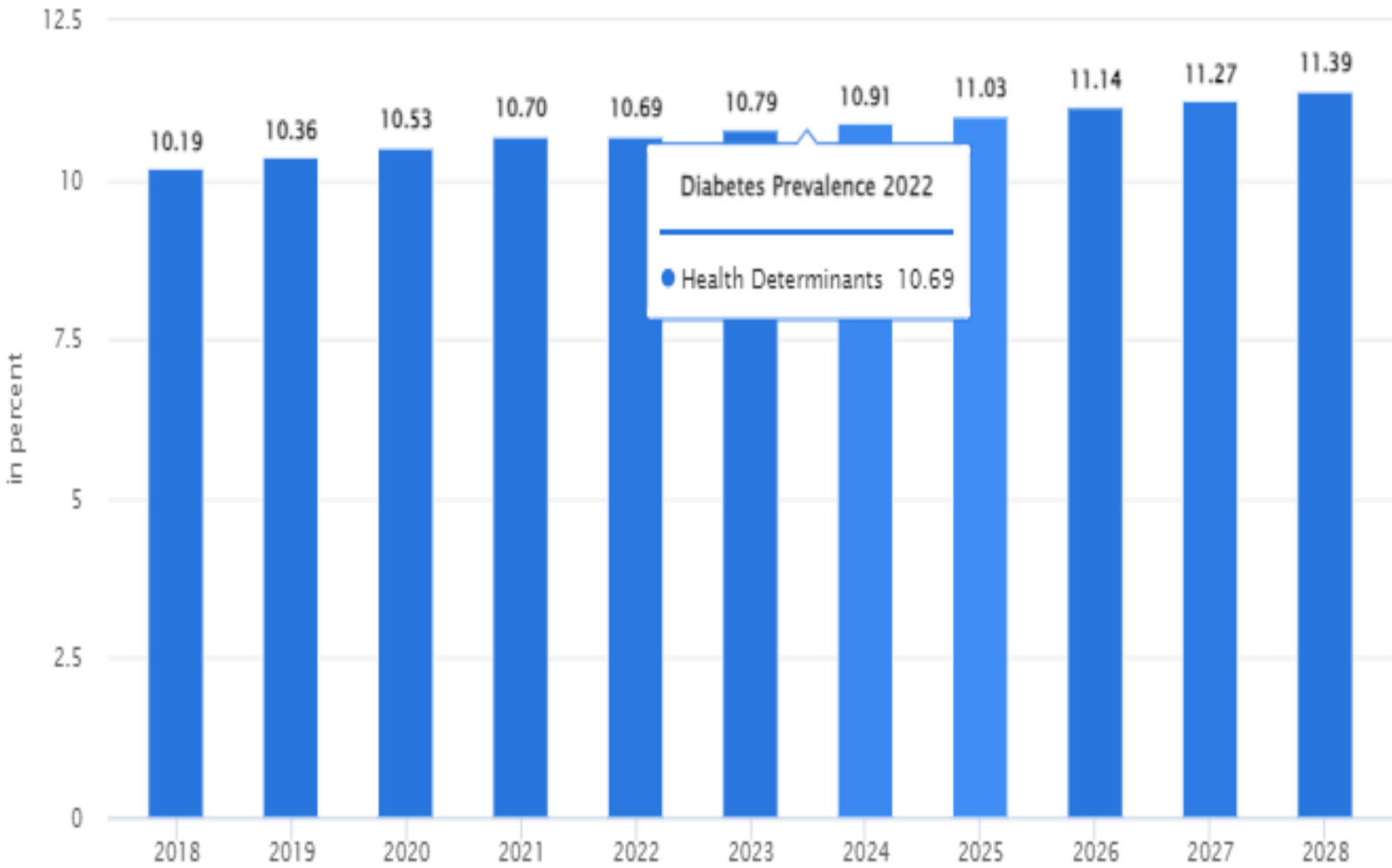
Iraq is one of the 21 countries and territories of the IDF MENA (middle east and north Africa).

Total adult population :21,391,100

Prevalence of diabetes in adults :9.4%-10.6%

Total cases of diabetes in adults :2,011,400

DIABETES PREVALENCE



Most recent update: Dec 2023

Sources: Statista Market Insights , World Bank



Iraq

Diabetes report 2000 – 2045

At a glance

2000

2011

2021

2030

2045

Diabetes estimates (20-79 y)

People with diabetes, in 1,000s

449.9

1,089.0

2,011.4

2,738.7

4,373.8

Age-adjusted comparative prevalence of diabetes, %

-

9.1

10.7

11.6

12.2

People with undiagnosed diabetes, in 1,000s

-

-

946.4

-

-

Proportion of people with undiagnosed diabetes, %

-

-

47.1

-

-

Type 1 diabetes estimates in children and adolescentsNew cases of type 1 diabetes
(0-14 y), in 1,000s

0.5

-

0.5

-

-

New cases of type 1 diabetes
(0-19 y), in 1,000s

-

-

0.7

-

-

Type 1 diabetes (0-14 y), in
1,000s

2.4

-

2.5

-

-

Type 1 diabetes (0-19 y), in
1,000s

-

-

5.0

-

-



Type 1 DM =

AFREZZA® INHALER



Table 2.3—Staging of type 1 diabetes

	Stage 1	Stage 2	Stage 3
Characteristics	<ul style="list-style-type: none"> ● Autoimmunity ● Normoglycemia ● Presymptomatic 	<ul style="list-style-type: none"> ● Autoimmunity ● Dysglycemia ● Presymptomatic 	<ul style="list-style-type: none"> ● Autoimmunity ● Overt hyperglycemia ● Symptomatic
Diagnostic criteria	<ul style="list-style-type: none"> ● Multiple islet autoantibodies ● No IGT or IFG 	<ul style="list-style-type: none"> ● Islet autoantibodies (usually multiple) ● Dysglycemia: IFG and/or IGT ● FPG 100–125 mg/dL (5.6–6.9 mmol/L) ● 2-h PG 140–199 mg/dL (7.8–11.0 mmol/L) ● A1C 5.7–6.4% (39–47 mmol/mol) or ≥10% increase in A1C 	<ul style="list-style-type: none"> ● Autoantibodies may become absent ● Diabetes by standard criteria

Adapted from Skyler et al. (40). FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; 2-h PG, 2-h plasma glucose. Alternative additional stage 2 diagnostic criteria of 30-, 60-, or 90-min plasma glucose on oral glucose tolerance test ≥200 mg/dL (≥11.1 mmol/L) and confirmatory testing in those aged ≥18 years have been used in clinical trials (79).

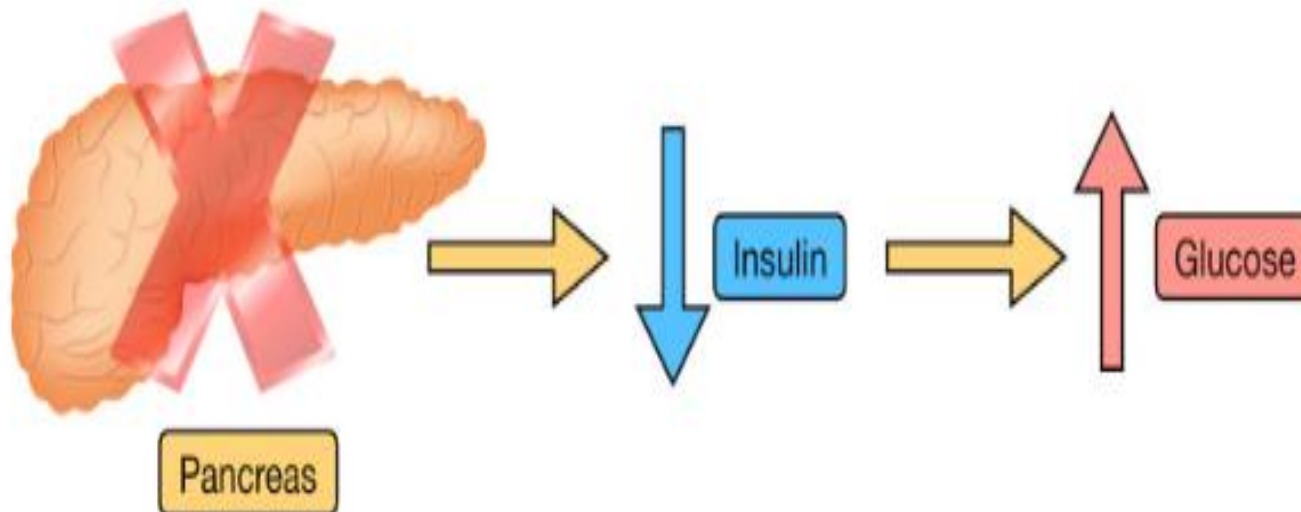


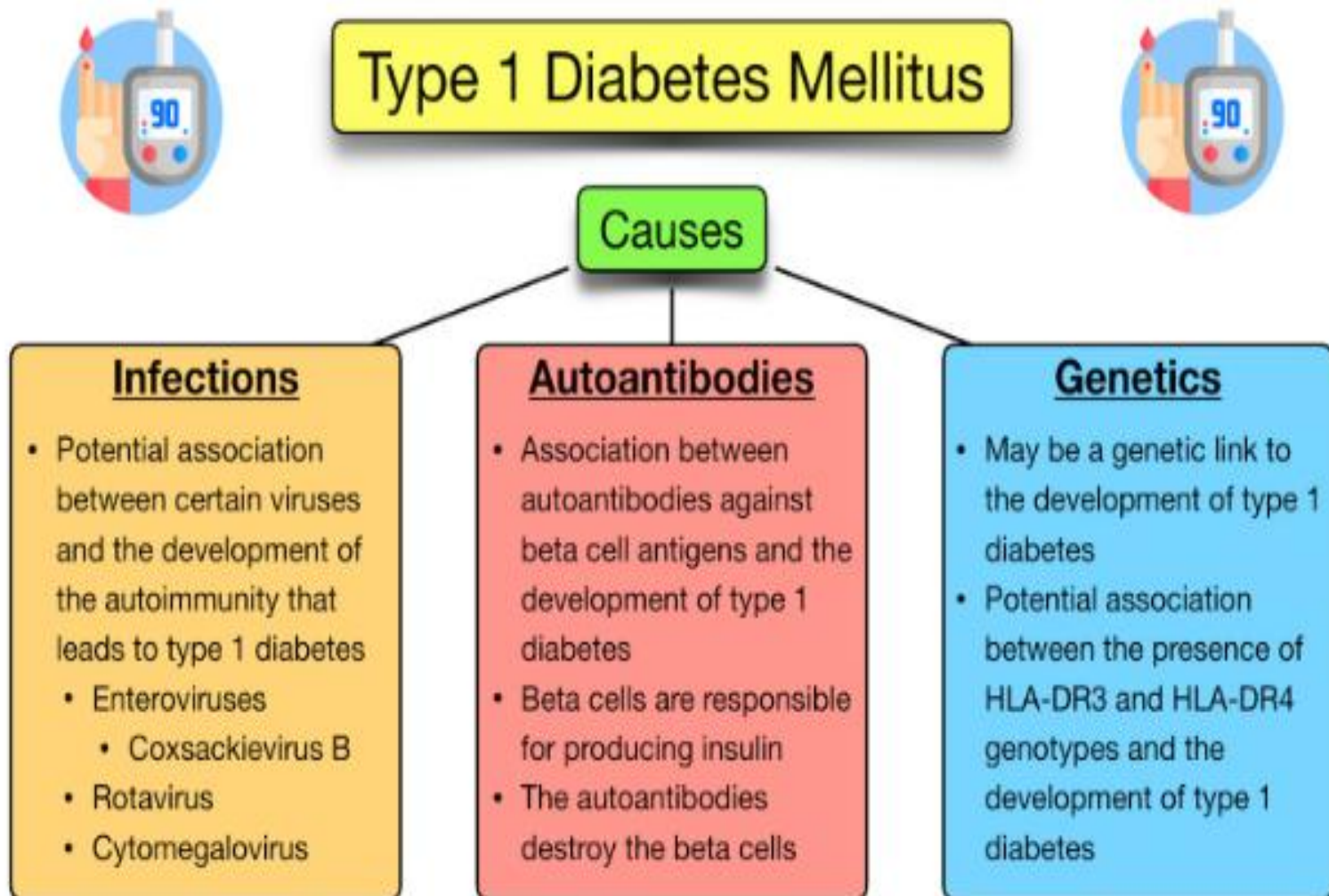
Type 1 Diabetes Mellitus



Definition

Type 1 Diabetes - An autoimmune disease in which the insulin-producing cells of the pancreas are destroyed, leading to high blood glucose levels





Type 1 Diabetes Causes: The pathophysiology and causes of type 1 diabetes include infections, autoantibodies, and genetics.



Type 1 Diabetes Mellitus



Risk Factors

Family History

- Family history of type 1 diabetes increases risk
- Increased risk if parent has type 1 diabetes
 - Even larger risk if both parents have it
- Family history of other autoimmune diseases increases the risk

Environmental

- Obesity
- Poorly-diverse gut microbiome
- Diet
 - Breastfeeding possibly decreases risk
 - Early cow's milk possibly increases risk
- Lack of vitamin D

Type 1 Diabetes Risk Factors: Risk factors for developing type 1 diabetes include family history, obesity, diet, lack of vitamin D exposure, etc.

PART 2

EPIDEMIOLOGY OF TYPE 1 DIABETES



Complications of

Diabetes

Type-1

Diabetes Mellitus Type-1 complications that can occur over time such as:

- Diabetic neuropathy
- Heart and blood vessel disease
- Diabetic nephropathy
- Diabetic retinopathy
- Skin and mouth infections
- Pregnancy complications
- Diabetic ketoacidosis



TYPE 1 DIABETES PREVENTION

- Monitor people at risk of developing type 1 diabetes.
- Teplizumab is recommended to delay the onset of stage 3
- (symptomatic) type 1 diabetes in people aged 8 years or older
- with preclinical (stage 2) type 1 diabetes.



Table 2.3—Staging of type 1 diabetes

	Stage 1	Stage 2	Stage 3
Characteristics	<ul style="list-style-type: none"> ● Autoimmunity ● Normoglycemia ● Presymptomatic 	<ul style="list-style-type: none"> ● Autoimmunity ● Dysglycemia ● Presymptomatic 	<ul style="list-style-type: none"> ● Autoimmunity ● Overt hyperglycemia ● Symptomatic
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Adapted from Skyler et al. (40). FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; 2-h PG, 2-h plasma glucose. Alternative additional stage 2 diagnostic criteria of 30-, 60-, or 90-min plasma glucose on oral glucose tolerance test ≥200 mg/dL (≥11.1 mmol/L) and confirmatory testing in those aged ≥18 years have been used in clinical trials (79).

Among study participants at high risk for type 1 diabetes with extended follow-up:



- Teplizumab, sold under the brand name Tziel, is a humanized anti-CD3 monoclonal antibody that is the first approved treatment indicated to **delay** the onset of stage 3 type 1 diabetes in people with stage 2 T1D.
- Each vial of teplizumab 1 mg/1 mL in 2-mL vials costs \$13,850, and a 14-day supply of teplizumab costs \$193,900

EPIDEMIOLOGY OF TYPE 2 DIABETES





Type 2 Diabetes Mellitus



Signs & Symptoms



Excessive Thirst



Weight Loss



Frequent Urination



Slow Healing



Excessive Hunger



Fatigue



Blurred Vision



Numbness

Type 2 Diabetes Symptoms: Signs and symptoms of type 2 diabetes include increased thirst (polydipsia), increased hunger (polyphagia), unexplained weight loss, fatigue, increased urine output (polyuria), blurred vision, numbness, etc.

RISK FACTORS FOR T2DM



Type 2 Diabetes Mellitus



Risk Factors

Modifiable

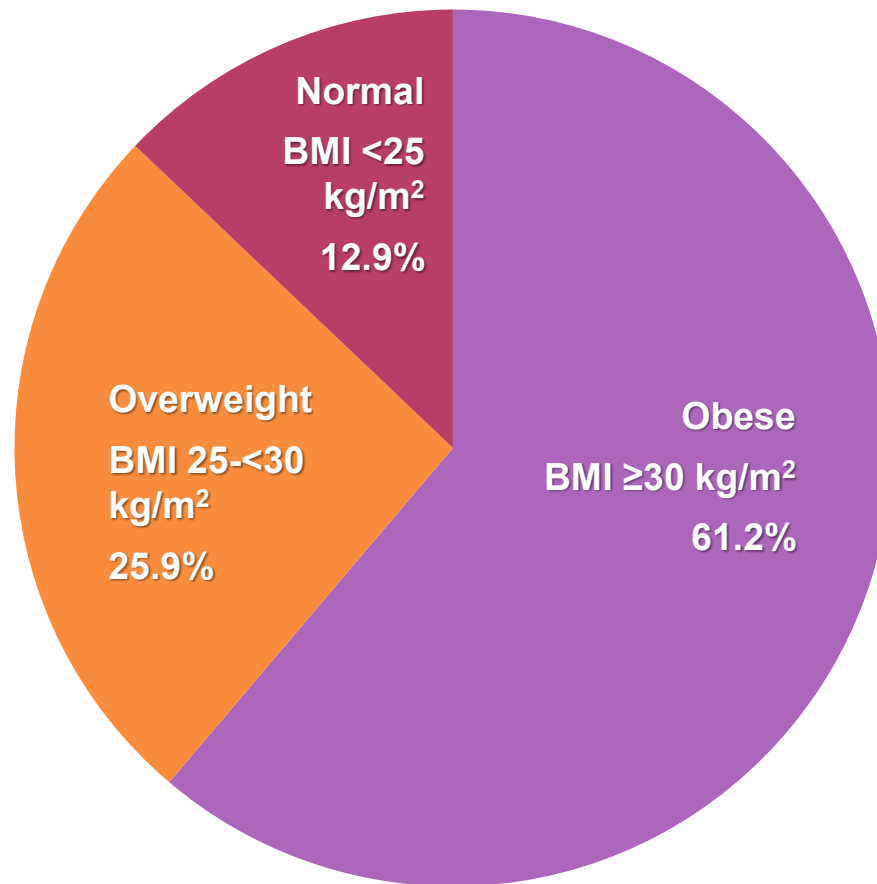
- Obesity
- Overweight
- Low physical activity
- Unbalanced diet
- Prediabetes
 - Higher than normal blood sugar, but not enough to be type 2 diabetes

Non-Modifiable

- Family history of diabetes
- Older than 45 years old
- South Asian, African, Hispanic ethnicity
- Low birth weight
- Previous pregnancy with gestational diabetes
- History of PCOS or other metabolic diseases

Type 2 Diabetes Risk Factors: Risk factors for developing type 2 diabetes include obesity, low physical activity, unbalanced diet, prediabetes, family history, age, ethnicity, gestational diabetes, etc.

PREVALENCE OF OVERWEIGHT AND OBESITY IN DIABETES



IS DIABETES HEREDITARY? HOW YOUR GENES CAN PLAY A ROLE

- It's true that diabetes tends to run in families.
- It depends on the type of diabetes and other factors, such as diet, lifestyle, and environment.
- "For most people who have diabetes, it is not due to a straight genetic group of factors or to environmental ones, but rather it is a combination of both, in fact it is **polygenic**

IS TYPE 2 DIABETES FAMILIAL?

- ⦿ Type 2 diabetes does run in families, but not only because family members are related.
- ⦿ Sometimes it's because they share certain habits that can increase their risk.
- ⦿ Family history is just one of several risk factors for type 2 diabetes.



3. FAMILY HISTORY

- A positive family history is an important risk factor for T2DM.

Positive Family history



Summary of strength of evidence on lifestyle factors and risk of developing type 2 diabetes

Evidence	Decreased risk	Increased risk
Convincing	Voluntary weight loss in overweight and obese people Physical activity	Overweight and obesity Abdominal obesity Physical inactivity Maternal diabetes ^a
Probable	NSP ¹	Saturated fats Intrauterine growth retardation
Possible	η -3 fatty acids Low glycaemic index foods Exclusive breast-feeding ^b	Total fat intake Trans-fatty acids
Insufficient	Vitamin E Chromium Magnesium Moderate alcohol	Excess alcohol

¹ NSP = non-starch polysaccharides.

^a Includes gestational diabetes.

^b As a global public health recommendation, infants should be exclusively breast-fed for the first six months of life to achieve optimal growth, development and health.

METABOLIC SYNDROM-X

A photograph of a person's midsection, showing a light-colored button-down shirt tucked into blue jeans with a black belt. The person has a noticeable belly. Five white circles are overlaid on the image, with lines pointing to a list of symptoms on the right. One of these circles is filled with a magenta color.

metabolic SYNDROME

SOURCE: AMERICAN HEART ASSOCIATION

increased waist
circumference or belly fat

high triglycerides

elevated blood pressure

high blood sugar

a low HDL
(good

THE METABOLIC SYNDROME

Working definition:

- **Glucose intolerance, IGT or DM and /or insulin resistance together with 2 or more of the following:**
- **Raised arterial BP (>140/90)**
- **Raised PL.TG \geq 150 mg/dl and/or low HDL-C (<35mg/dl in males; < 39 mg/dl in females)**
- **Central obesity waist: hip ratio: Males: >0.9, Females: >0.85**
- **And /or BMI >30**
- **Microalbuminuria (\geq 20 ug/min or Albumin/creatinin ratio \geq 30 mg/gm)**
- **Other components: hyperuricemia, coagulation disorders, raised PAI-1**

RISK FACTORS OF METABOLIC SYN.

Age	The prevalence of metabolic syndrome increases with age, affecting less than 10% of people in their 20s and 40% of people in their 60s.
Race	Metabolic syndrome is generally more common among blacks and Mexican-Americans than among Caucasians.
Obesity	A body mass index (BMI) greater than 25 increases your risk of metabolic syndrome and abdominal obesity increase the risk of MS. Abdominal obesity refers to having an apple shape rather than a pear.
History of diabetes	Having a family history of type 2 diabetes or diabetes during pregnancy (gestational diabetes) increases the risk for developing metabolic syndrome.
Other diseases	A diagnosis of hypertension, cardiovascular disease (CVD) or polycystic ovary syndrome (a hormonal disorder in which a woman's body produces an excess of male hormones) also increases the risk for metabolic syndrome.

Table 2.3—Criteria for screening for diabetes or prediabetes in asymptomatic adults

1. Testing should be considered in adults with overweight or obesity (BMI ≥ 25 kg/m² or ≥ 23 kg/m² in Asian Americans) who have one or more of the following risk factors:
 - First-degree relative with diabetes
 - High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
 - History of CVD
 - Hypertension ($\geq 140/90$ mmHg or on therapy for hypertension)
 - HDL cholesterol level < 35 mg/dL (0.90 mmol/L) and/or a triglyceride level > 250 mg/dL (2.82 mmol/L)
 - Women with polycystic ovary syndrome
 - Physical inactivity
 - Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
2. Patients with prediabetes (A1C $\geq 5.7\%$ [39 mmol/mol], IGT, or IFG) should be tested yearly.
3. Women who were diagnosed with GDM should have lifelong testing at least every 3 years.
4. For all other patients, testing should begin at age 35 years.
5. If results are normal, testing should be repeated at a minimum of 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.
6. People with HIV

CVD, cardiovascular disease; GDM, gestational diabetes mellitus; IFG, impaired fasting glucose; IGT, impaired glucose tolerance.

USE OF A1C FOR SCREENING AND DIAGNOSIS OF DIABETES

The A1C test should be performed using a method that is certified by the National Glycohemoglobin Standardization Program (NGSP) as traceable to the Diabetes Control and Complications Trial (DCCT) reference assay.

Table 2.6—Risk-based screening for type 2 diabetes or prediabetes in asymptomatic children and adolescents in a clinical setting

Screening should be considered in youth* who have overweight (≥ 85 th percentile) or obesity (≥ 95 th percentile) **A** and who have one or more additional risk factors:

- Maternal history of diabetes or GDM during the child's gestation **A**
 - Family history of type 2 diabetes in first- or second-degree relative **A**
 - High-risk race, ethnicity, and ancestry **A** (see [Table 2.5](#))
 - Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, large- or small-for-gestational-age birth weight) **B**
-

GDM, gestational diabetes mellitus. *After the onset of puberty or after 10 years of age, whichever occurs earlier. If tests are normal, repeat testing at a minimum of 3-year intervals (or more frequently if BMI is increasing or risk factor profile is deteriorating) is recommended. Reports of type 2 diabetes before age 10 years exist, and this can be considered with numerous risk factors.

Table 2.7—Screening for and diagnosis of GDM

One-step strategy

Perform a 75-g OGTT, with plasma glucose measurement when an individual is fasting and at 1 and 2 h, at 24–28 weeks of gestation in individuals not previously diagnosed with diabetes. The OGTT should be performed in the morning after an overnight fast of at least 8 h. The diagnosis of GDM is made when any of the following plasma glucose values are met or exceeded:

- Fasting: 92 mg/dL (5.1 mmol/L)
- 1 h: 180 mg/dL (10.0 mmol/L)
- 2 h: 153 mg/dL (8.5 mmol/L)

Two-step strategy

Step 1: Perform a 50-g GLT (nonfasting), with plasma glucose measurement at 1 h, at 24–28 weeks of gestation in individuals not previously diagnosed with diabetes.

If the plasma glucose level measured 1 h after the load is ≥ 130 , 135, or 140 mg/dL (7.2, 7.5, or 7.8 mmol/L, respectively),* proceed to a 100-g OGTT.

Step 2: The 100-g OGTT should be performed when the individual is fasting.

The diagnosis of GDM is made when at least two† of the following four plasma glucose levels (measured fasting and at 1, 2, and 3 h during OGTT) are met or exceeded (Carpenter-Coustan criteria [226]):

- Fasting: 95 mg/dL (5.3 mmol/L)
- 1 h: 180 mg/dL (10.0 mmol/L)
- 2 h: 155 mg/dL (8.6 mmol/L)
- 3 h: 140 mg/dL (7.8 mmol/L)

GDM, gestational diabetes mellitus; GLT, glucose load test; OGTT, oral glucose tolerance test. *American College of Obstetricians and Gynecologists (ACOG) recommends any of the commonly used thresholds of 130, 135, or 140 mg/dL for the 1-h 50-g GLT (222). †ACOG notes that one elevated value can be used for diagnosis (222).

PREDIABETES

WHAT IS PREDIABETES?

- ⦿ **Prediabetes means your blood sugar level is higher than normal but not high enough to be diagnosed with diabetes. It is a warning sign, signaling a need for lifestyle changes.**
- ⦿ **Those with prediabetes typically develop type 2 diabetes within several years and are also at increased risk for serious health problems such as stroke and heart disease.**

Table 2.2—Criteria defining prediabetes in nonpregnant individuals

A1C 5.7–6.4% (39–47 mmol/mol)

OR

FPG 100 mg/dL (5.6 mmol/L) to 125 mg/dL (6.9 mmol/L) (IFG)

OR

2-h PG during 75-g OGTT 140 mg/dL (7.8 mmol/L) to 199 mg/dL (11.0 mmol/L) (IGT)

For all three tests, risk is continuous, extending below the lower limit of the range and becoming disproportionately greater at the higher end of the range. FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test; 2-h PG, 2-h plasma glucose.

Prediabetes

Prediabetes means your blood sugar level is higher than normal but not high enough to be diagnosed with diabetes. It is a warning sign, signaling a need for lifestyle changes.

More than
1 in 3 
adults have prediabetes

9 out of 10
don't know they have prediabetes


Who is at risk?

45+

Over 45 years old



Overweight



Have a parent or sibling with diabetes



Had gestational diabetes



Have high blood pressure



Not physically active

How can I reduce my risk?



Keep a healthy weight



Eat healthy foods



Move more



Quit smoking/tobacco use

For more information, visit
parkview.com/diabetes



**PREVENTION OR
DELAY OF
DIABETES AND
ASSOCIATED
COMORBIDITIES
2024-ADA**

OVERALL RECOMMENDATIONS

- ⦿ In people with prediabetes, monitor for the development of type 2 diabetes at least annually.
- ⦿ In people with preclinical type 1 diabetes, monitor for disease progression using A1C approximately every 6 months and 75-g oral glucose tolerance test (i.e., fasting and 2-h plasma glucose) annually.

(POSSIBLE TEPLIZUMAB??)

LIFESTYLE BEHAVIOR CHANGE FOR DIABETES PREVENTION

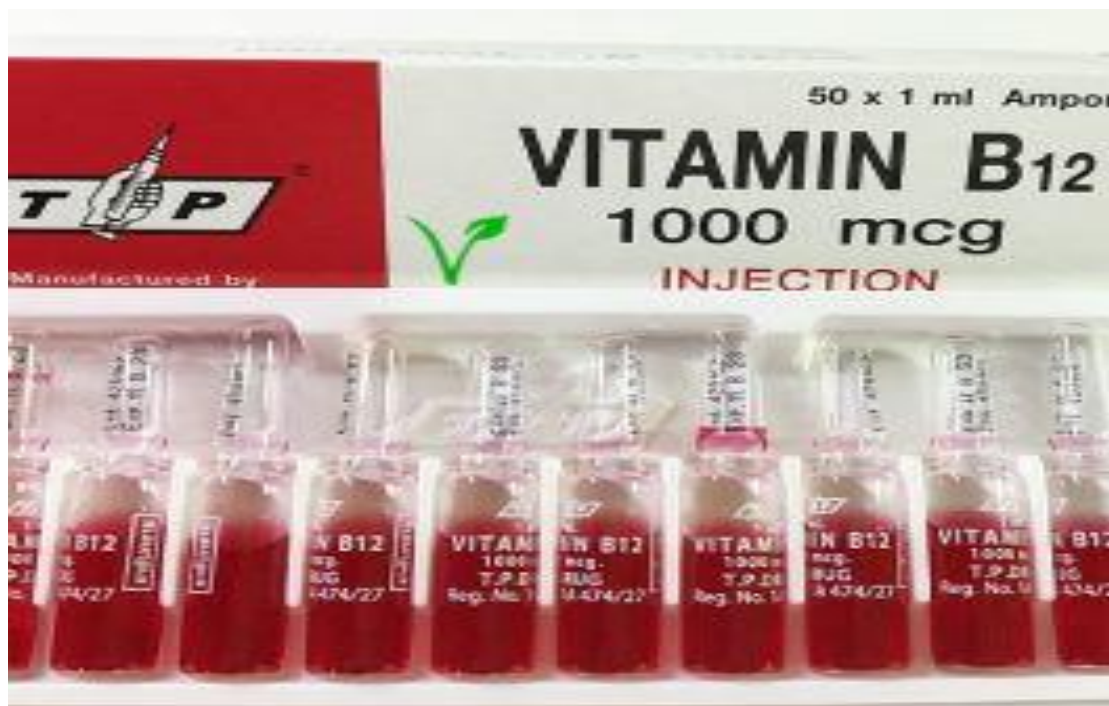
- Refer adults with overweight/obesity at high risk of type 2 diabetes, as typified by the Diabetes Prevention Program (DPP), to an intensive lifestyle behavior change program to achieve and maintain a weight reduction of at least 7% of initial body weight through healthy reduced-calorie diet and 150 min/week of moderate intensity physical activity.
- A variety of eating patterns can be considered to prevent diabetes in individuals with prediabetes.

PHARMACOLOGIC INTERVENTIONS

- Metformin therapy for the prevention of type 2 diabetes should be considered in adults at high risk of type 2 diabetes, especially those aged
 - 25- 59 years with
 - BMI 35 kg/m²
 - FBS=110 mg/Dl (PREDIABETES)
 - Higher and A1C (PREDIABETES)
 - Gestational diabetes



Long-term use of metformin may be associated with biochemical vitamin B12 deficiency; consider periodic measurement of vitamin B12 levels in metformin- treated individuals, especially in those with anemia or peripheral neuropathy.



PREVENTION OF VASCULAR DISEASE AND MORTALITY

Statin therapy may **increase the risk of type 2 diabetes** in people at high risk of developing type 2 diabetes.

In such individuals, glucose status should be monitored regularly .

It is not recommended that statins be discontinued



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In people with a history of stroke and evidence of insulin resistance and prediabetes, pioglitazone may be considered to lower the risk of stroke or myocardial infarction.

However, this benefit needs to be balanced

with the increased risk of **weight gain, edema, and fracture.**

A Lower doses may reduce the risk of adverse effects.



LEVEL	RISK FACTORS	DISEASE	COMPLICATIONS	MODE OF INTERVENTIONS
<p><u>PRIMORDIAL</u></p> <p>To keep body healthy, prevent body from occurrence of risk factors.</p>	Absent	Absent	Absent	<p><u>INDIVIDUAL AND MASS EDUCATION</u></p> <ul style="list-style-type: none"> • Educate to maintain normal body weight. • Adoption of healthy nutritional habits and physical exercise. • Childhood obesity prevention through education. • Educate to maintain a nutritious diet. • Girls in reproductive age or even in childhood maintain weight, take appropriate nutrition, and be physically active.

LEVEL	RISK FACTORS	DISEASE	COMPLICATIONS	MODE OF INTERVENTIONS
<p><u>PRIMARY</u></p> <p>To prevent the disease from occurrence by overcoming the risk factors.</p>	<p>Present</p>	<p>Absent</p>	<p>Absent</p>	<ul style="list-style-type: none"> ❖ <u>HEALTH PROMOTION</u> <ul style="list-style-type: none"> • Avoid sedentary behavior. • Be physically active. • Eat healthy and balanced diet; low saturated fats , a low added sugars and high fiber diet. ❖ <u>SPECIFIC PROTECTION</u> <ul style="list-style-type: none"> • Aerobic exercises results in weight loss. • Quit smoking. • Immunomodulation to delay the occurrence of T1DM.

LEVEL	RISK FACTORS	DISEASE	COMPLICATION	MODE OF INTERVENTIONS
<p><u>SECONDARY</u></p> <p>To prevent the further progression of disease and prevention of diabetic complications.</p>	Present	Present	Absent	<p>❖ <u>EARLY DIAGNOSIS</u></p> <ul style="list-style-type: none"> • Classic signs of hyperglycemia; high sugar level, increase thirst, increase hunger, dehydration and so on. • Fasting plasma glucose test • Oral glucose tolerance test • HbA1C <p>❖ <u>TREATMENT</u></p> <ul style="list-style-type: none"> • Administer insulin • Lifestyle changes. • Adjusting diet and staying active • Monitoring and maintaining glucose levels • Manage high blood pressure • Treat dyslipidemia • Smoking cessation

LEVEL	RISK FACTORS	DISEASE	COMPLICATION	MODE OF INTERVENTIONS
<u>SECONDARY</u>	Present	Present	Absent	<ul style="list-style-type: none"> • Medications; metformin • Recognition of symptoms associated with hypoglycemia. • Attending periodic checkups. • Routine checking of blood sugar, of urine for proteins and ketones, of blood pressure, visual acuity and weight should be done . • The foot should be examine for any defective blood circulation , loss of sensation and the health of the skin.

LEVEL	RISK FACTOR	DISEASE	COMPLICATION	MODE OF INTERVENTIONS
<p><u>TERTIARY</u></p> <p>Prevent the worsening of complications and rehab patient.</p>	Present	Present	Present	<p>❖ <u>COMPLICATIONS</u></p> <p><u>LIMITATIONS:</u></p> <ul style="list-style-type: none"> • Screening of patients with diabetes for diabetic retinopathy to prevent progression to blindness through prompt treatment • Prevent recurrence or further complications through appropriate medication. • Appropriate diabetic foot care to avoid further damage or foot complications or to preventing from spreading further; wear appropriate shoes, never go barefoot, keep toenails trimmed. • CVD patients take high HDL, low LDL, high fiber diet, 30 minutes brisk walk.

LEVEL	RISK FACTOR	DISEASE	COMPLICATION	MODE OF INTERVENTIONS
<u>TERTIARY</u>	Present	Present	Present	<ul style="list-style-type: none"> • People, especially older ones, with diabetic complications such as autonomic neuropathy, cardiovascular disease should avoid exercising outdoors on very hot and humid days. ❖ <u>REHABILITATION:</u> <ul style="list-style-type: none"> • Follow-up to ensure adherence to medication regimen, monitor changes, and assist them in maintaining independence in daily life. • Participate in social gathering. • Attain glycemic control. • Patient education is important to help people with diabetes enhance self care. • Psychological support • Exercises • Other behavior modifications(physically active, healthy diet, smoking cessation)

REFERENCES

- ◉ **Park,s Text Book Of Preventive And Social Medicine 23rd Edition**
- ◉ <https://idf.org/our-network/regions-and-members/middle-east-and-north-africa/members/iraq/>
- ◉ <https://diabetesatlas.org/atlas-presentation/>

THANK YOU