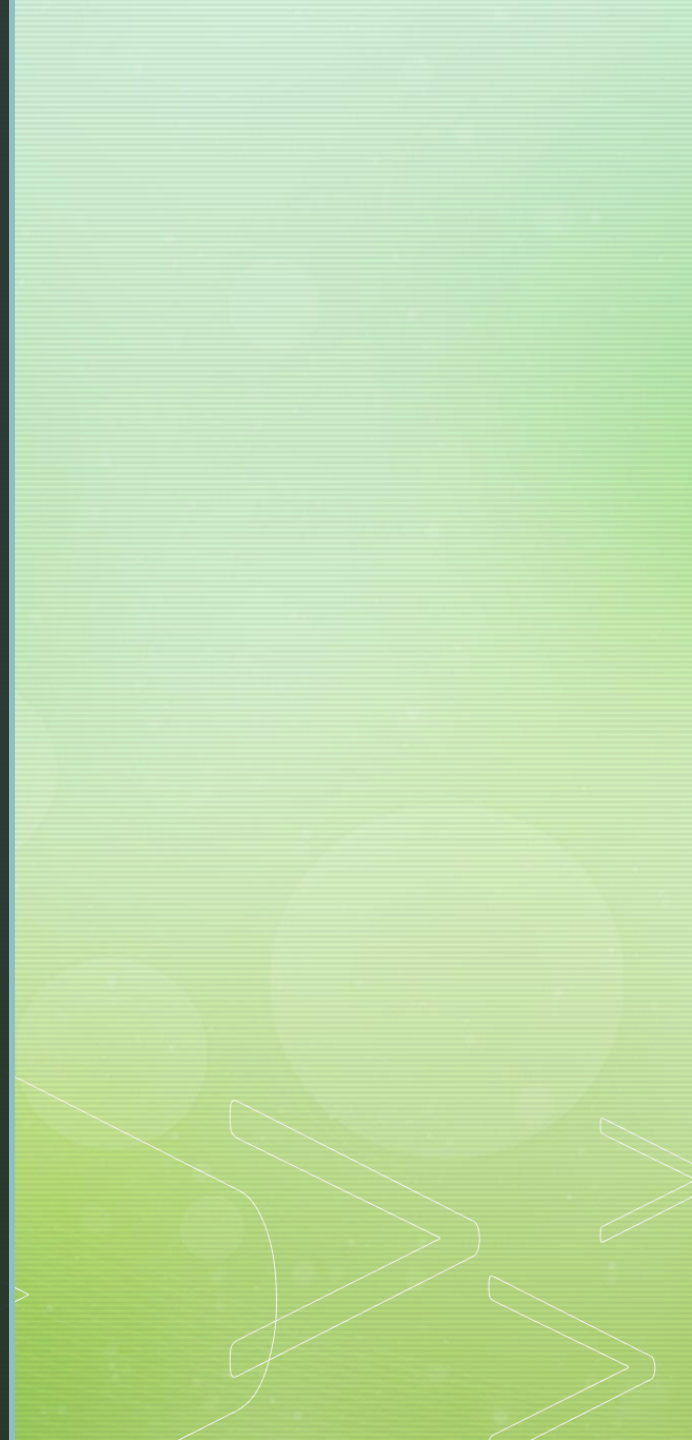


Diabetes Mellitus



Dr Warda Salahuddin

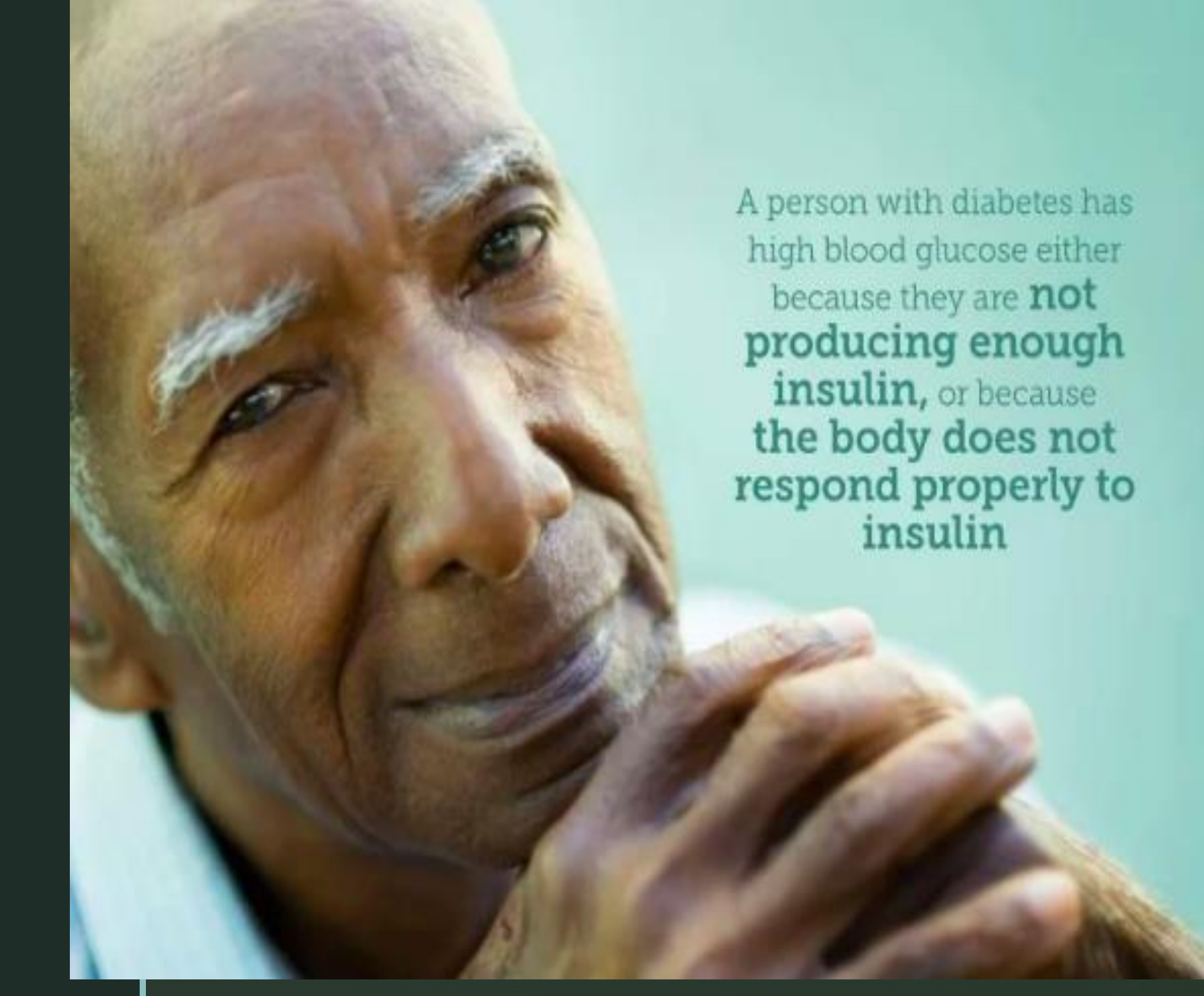
Community Medicine Department





Learning Objectives

- By the end of this lecture you should be able to know
- Epidemiology of diabetes
- Risk factors of diabetes
- Prevention of diabetes



A person with diabetes has high blood glucose either because they are **not producing enough insulin**, or because **the body does not respond properly to insulin**

What is diabetes?

There are **three main types** of diabetes:

Type 1 diabetes, type 2 diabetes and gestational diabetes

Poorly managed diabetes leads to **serious complications** and early death

With good self-management and **health professional support**, people with diabetes can live a long, **healthy life**



Types of diabetes

Type 1 DM

Type 2 DM

Gestational Diabetes

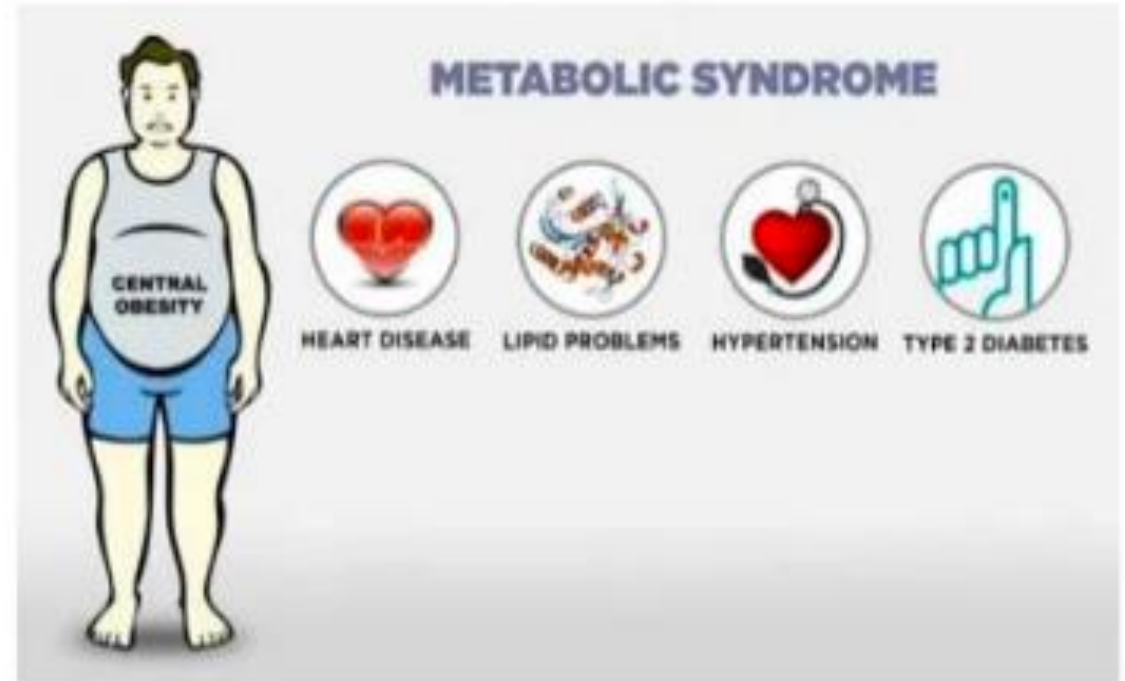
LADA (latent autoimmune diabetes in adults)

MODY (maturity-onset diabetes of youth)

Secondary DM

DM as part of metabolic syndrome

- Type 2 diabetes and cardiovascular share a common antecedent.
- The concept **The Metabolic Syndrome**
- Clustering of central obesity with several other major cardiovascular disease risk factors



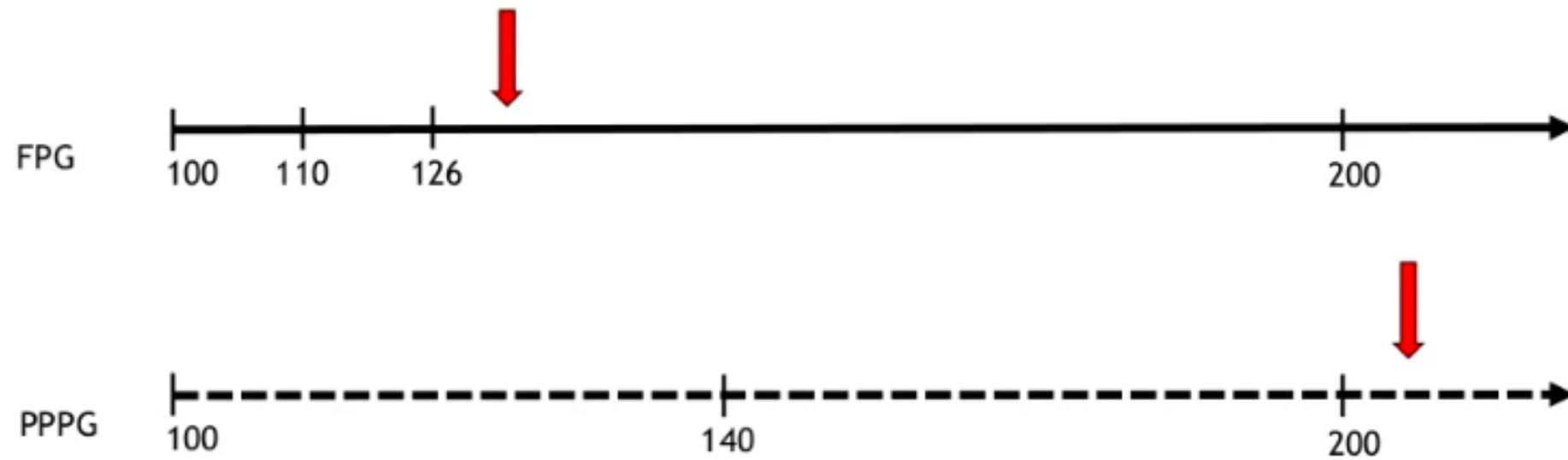
Diagnostic Criteria

Fasting plasma glucose	≥ 7.0 mmol/l ≥ 126 mg/dl	6.1–6.9 mmol/l 110–125 mg/dl
2 h plasma glucose after OGTT	≥ 11.1 mmol/l ≥ 200 mg/dl	7.8–11.0 mmol/l 140–199 mg/dl
Random plasma glucose	≥ 11.1 mmol/l ≥ 200 mg/dl	
Glycosylated haemoglobin	$\geq 6.5\%$	

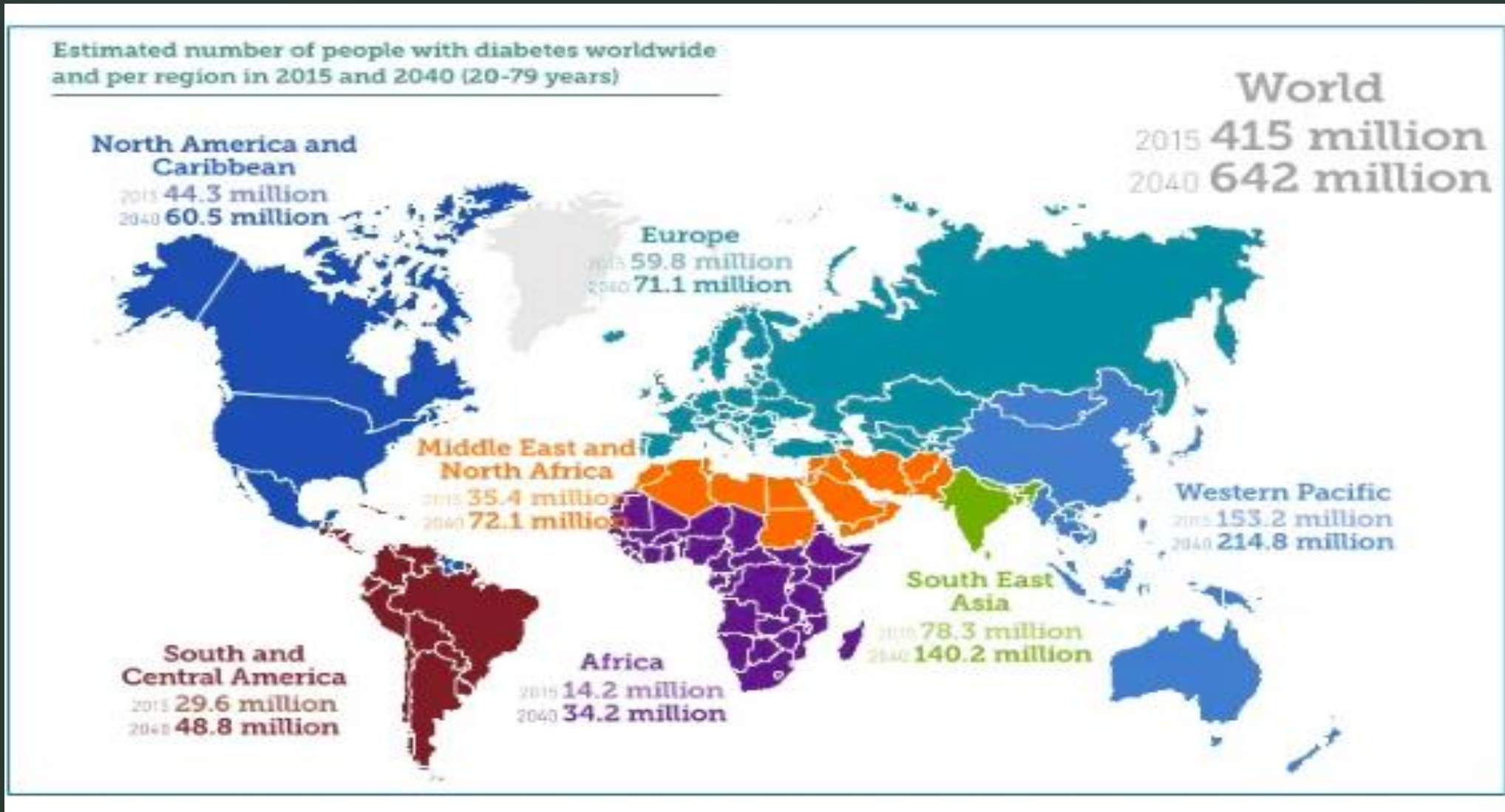
* Adapted from World Health Organization and International Diabetes Federation.⁶

DM = diabetes mellitus; OGTT = oral glucose tolerance test.

DM



GLOBAL BURDEN OF DIABETES



Mortality due to diabetes

Adults who died from diabetes, HIV/AIDS, tuberculosis, and malaria



5.0 million

from diabetes
2015
IDF



1.5 million

from HIV/AIDS
2013
WHO Global Health
Observatory Data
Repository 2013



1.5 million

from tuberculosis
2013
WHO Global Health
Observatory Data
Repository 2013



0.6 million

from malaria
2013
WHO Global Health
Observatory Data
Repository 2013

TOP 10 COUNTRIES WITH DIABETES

Top 15 Countries with the Highest Rate of Diabetes (IDF 2014)

1. [Pakistan](#) — 30.8%
2. French [Polynesia](#) (France territory) — 25.2%
3. [Kuwait](#) — 24.9%
4. [Nauru](#) — 23.4%
5. New Caledonia (France territory) — 23.4%
6. Northern Mariana Islands (U.S. territory) — 23.4%
7. [Marshall Islands](#) — 23.0%
8. [Mauritius](#) — 22.6%
9. [Kiribati](#) — 22.1%
10. [Egypt](#) — 20.9%
11. American [Samoa](#) (U.S. territory) — 20.3%
12. [Tuvalu](#) — 20.3%
13. [Solomon Islands](#) — 19.8%
14. [Qatar](#) — 19.5%
15. Guam (U.S. territory) — 19.1%

TRENDS OF DIABETES IN PAKISTAN

Table II

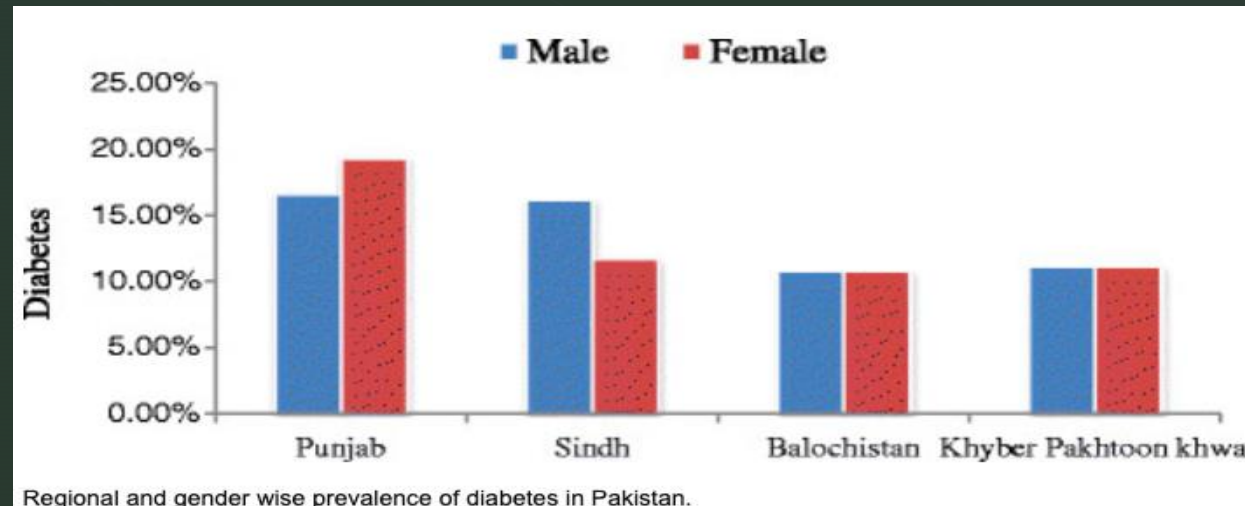
Prevalence of diabetes, prediabetes and its risk factors in the adult population of Pakistan, from Jan. 1995 to Aug. 2018.

Column I	Studies	Sample	Cases	Prevalence, % (95%CI)	I ² , %	Heterogeneity	P-Egger test
Diabetes	14	49418	6884	14.62(10.651-19.09)	0.993	< 0.001	0.6559
Undiagnosed	6	36748	1443	9.27(3.25-17.94)	0.997	< 0.001	0.1267
Prediabetes	10	26999	3185	11.43(8.26-15.03)	0.985	< 0.001	0.6508
By Sex							0.0278
Male	10	6131	817	14.80(9.83-20.59)	0.982	< 0.0001	
Female	10	11011	1811	15.83(10.05-22.63)	0.976	< 0.0001	
By setting							0.374
Urban	5	5472	845	17.72(12.22-23.98)	0.969	< 0.001	
Rural	7	10969	1206	12.10(8.75-15.89)	0.969	< 0.001	
By Age	5						
25-34	5	3119	93	3.24(2.32-4.30)	0.5	0.0915	0.0044
35-44	5	2544	275	12.83(8.43-17.97)	0.909	< 0.001	
45-54	5	2212	365	19.52(13.56-26.25)	0.918	< 0.001	
55-64	5	1642	288	20.73(14.69-27.50)	0.886	< 0.001	
65-74	5	855	160	21.84 (15.36-30.08)	0.817	0.0002	
75+	5	319	60	18.86 (8.16-37.81)	0.871	< 0.001	
By Province							0.2263
Panjab	6	11809	2685	18.52(10.74-27.82)	0.992	< 0.001	
Sindh	3	22709	2683	19.25(5.60-38.48)	0.998	< 0.001	

[Open in a separate window](#)

REGIONAL PREVALANCE IN PAKISTAN

The prevalence of diabetes in Pakistan was revealed **14.62%** (10.651%–19.094%; 14 studies) based on 49,418 people using the inverse–variance random–effects model. The prevalence of prediabetes was 11.43% (8.26%–15.03%; 10 studies) based on a total sample of 26,999 people.



Etiology of Type 1 DM

- **Autoimmune disease**
- **Selective destruction of β cells by T cells**
- **Several circulating antibodies against β cells**
- **Cause of autoimmune attack: unknown**
- **Both genetic & environmental factors are important**

Etiology of Type 2 DM

- **Response to insulin is decreased**
 - ↓glucose uptake (muscle, fat)
 - ↑glucose production (liver)
- **The mechanism of insulin resistance is unclear**
- **Both genetic & environmental factors are involved**
- **Post insulin receptor defects**

Comparison of type 1 and 2 diabetes		
Feature	Type 1 diabetes	Type 2 diabetes
Onset	Sudden	Gradual
Age at onset	Any age (mostly young)	Mostly in adults
Body habitus	Thin or normal	Often obese
Ketoacidosis	Common	Rare
Autoantibodies	Usually present	Absent
Endogenous insulin	Low or absent	Normal, decreased or increased
Concordance in identical twins	50%	90%
Prevalence	Less prevalent	More prevalent - 90 to 95% of

Comparison between type 1 & 2 DM

Risk factors for type 2 DM

- Age
- Family history
- Ethnicity

- Physical inactivity
- Overweight and obesity
- High-fat and low-fiber diet

- Urbanisation
- Low birth weight

Risk factors for type 2 DM

- Non Modifiable

- Genetic factors
- Age
- Ethnicity

- Modifiable

- Obesity and physical inactivity
- Metabolic factors: IGT, IFG and GDM

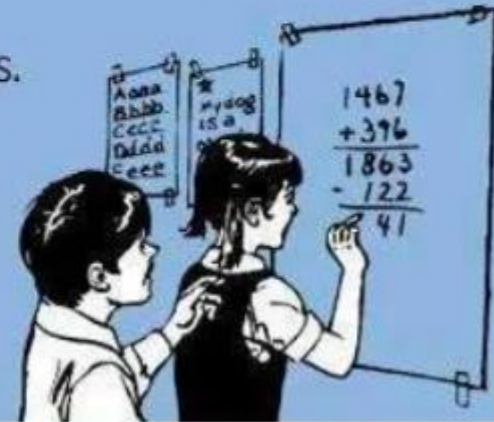


Risk factors for type 2 DM

Dietary factors

- Characteristics of fat intake
- Dairy
- Glycemic load
- “Western diet”
- Fast food intake
- Soda intake
- Alcohol intake

Billy has 32 candy bars. He eats 28.
What does he have now?
Diabetes.
Billy has diabetes.



someecards
user card

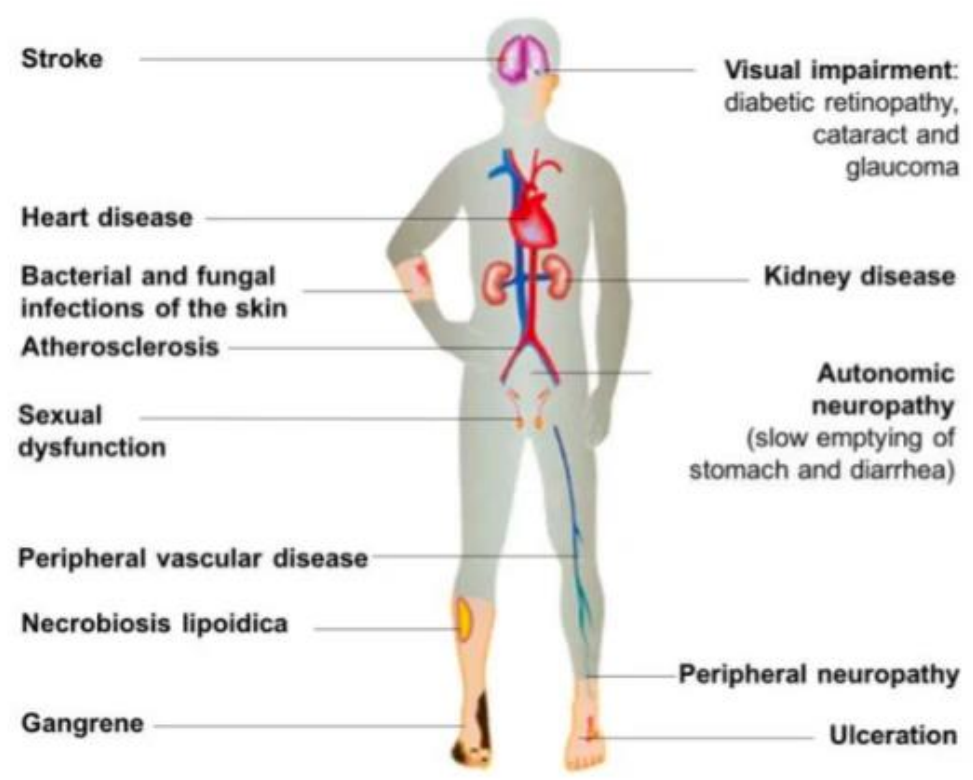
- **Ketoacidosis**
- Recurrent or persistent infections (including tuberculosis)
- Both hyperglycaemia and hypoglycaemia may cause coma



Complications of DM

Short term effects of diabetes

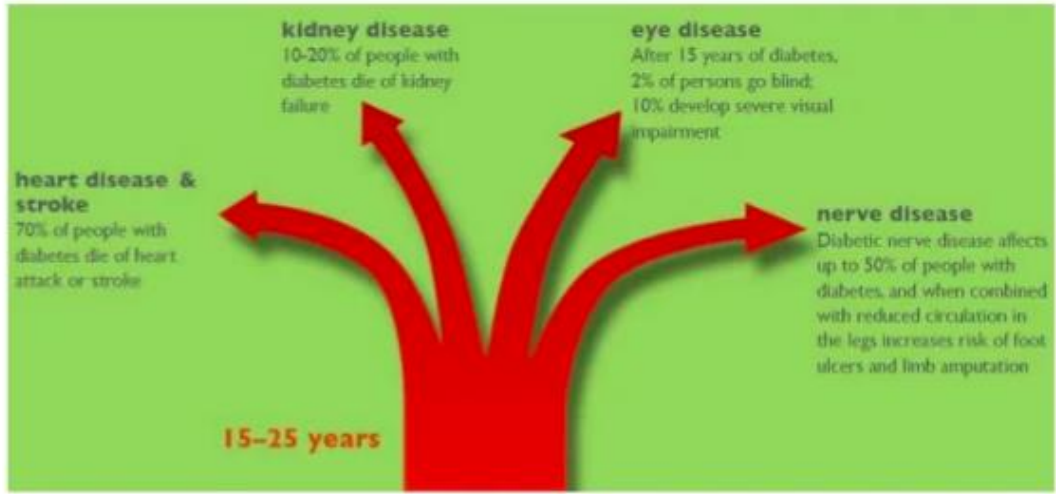




Complications of DM

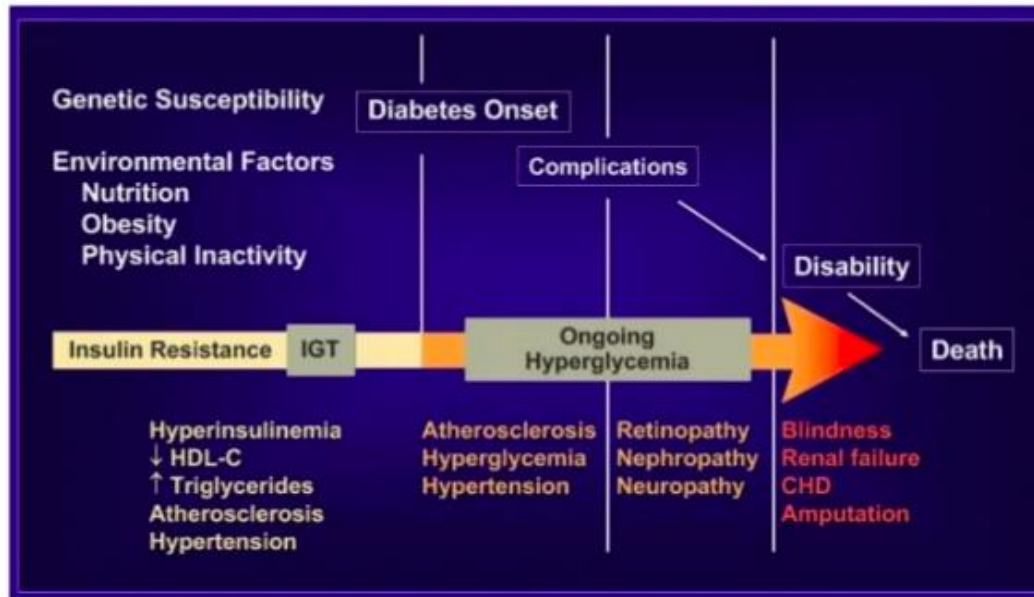
Long term effects of diabetes

1. Microvascular
2. Macrovascular



Complications of DM

Prevalence & timeline



Complications of DM

Continuum of CVD risk



Prevention & control

Why is the prevalence of DM increasing?

- Aging of the population
- Urbanization especially in the developing countries
- More sedentary lifestyle
- Food consumption patterns
 - More foods with high fat content
 - More refined carbohydrates



Why should we prevent diabetes?

- To reduce human suffering
- Improve Quality of Life
- Reduce the number of hospitalization
- Reduce mortality from diabetes
- Prevent sudden cardiac death



Managing Diabetes

The human and economic costs of diabetes could be significantly reduced by investing in prevention, particularly early detection, in order to avoid the onset of diabetic complications

At least 50% of all people with diabetes are unaware of their condition



Levels of prevention in Type 2 DM

- **Primary**
 - Includes activities aimed at preventing diabetes from occurring in susceptible populations
- **Secondary**
 - Early diagnosis and effective control of diabetes in order to delay the progress of the disease
- **Tertiary**
 - Prevent complications and disabilities due to diabetes



