

Family and Community medicine

Epidemiology of Diabetes Mellitus

DR ALAA A.SALIH FICMS-FM -2017

Definition:

It is a heterogeneous group of disorders characterized by hyperglycemia, and disturbances of carbohydrate, fat and protein metabolism with absolute or relative deficiency of insulin action and or secretion.

Epidemiology of Type 1 Diabetes

- T1DM develops in genetically susceptible individuals after a preclinical phase of variable length usually with immune-mediated destruction of pancreatic β cells, and requires lifelong treatment with **insulin**.
- The disease can occur at any age, but the incidence peaks around puberty.
- Classification of T1DM versus type 2 diabetes mellitus (T2DM) becomes increasingly difficult with age.
- In childhood, the incidence is similar in females and males, but there is a 1.3–2.0-fold male excess in incidence after about 15 years of age in most populations
- The incidence in childhood varies enormously between countries.
- Some Asian and South American populations have low incidences.
- About 10–20% of newly diagnosed childhood cases of T1DM have an affected first-degree relative.
- Those with an affected sibling or parent have a cumulative risk of 3–7% up to about 20 years of age, compared with cumulative risks of 0.2–0.8% in the respective general populations.
- The cumulative incidence among monozygotic co-twins of persons with T1DM is less than 50%, even after >30 years' follow-up.
- Some of the geographic differences and familial aggregation may be explained by human leukocyte antigen .

- Even though insulin replacement therapy and other advances in the management of T1DM have improved the prognosis of persons with T1DM, their mortality is still at least two times (~2–8-fold) higher than in the background population.
- This is because of both acute and chronic complications of the disease, including cardiovascular disease, after about 30 years of age.

Environmental risk factors for T1DM

May have a role in the following:

1. Initiating of the autoimmune disease process.
2. Modulating the progression from islet autoimmunity to clinical T1DM;
3. “precipitating” disease in individuals with advanced preclinical disease.

Specific putative environmental factors

1. Viral infections

- Congenital rubella syndrome has been associated with a several-fold increase in the incidence of T1DM .
- It probably remains the best example of a non-genetic factor contributing to increased risk of T1DM in humans.
- Increased risk of childhood-onset T1DM has been associated with evidence of maternal enterovirus infections during pregnancy in some studies.
- Based on early data the Coxsackie B4 serotype of human enterovirus has been suspected to be particularly diabetogenic.

2. Toxins

- A number of other environmental chemicals may influence the immune system and potentially the risk of T1DM .
- The rodenticide has been associated with T1DM in humans after ingestion of large doses
- A potential diabetogenic role of in utero exposure to bafilomycin, a toxin produced by bacteria growing on the skin of root vegetables such as potatoes.
- In a prospective study, there was no support for the idea that frequent potato consumption during pregnancy could increase the risk of islet autoimmunity in the offspring .

3. Nutritional factors

- Several possible plausible mechanisms have been proposed to link dietary factors to T1DM, including “molecular mimicry” and a detrimental effect of bovine insulin in cow’s milk .
- A reduced risk conferred by prolonged breastfeeding and/or delayed introduction of cow’s milk has been suggested in Part 1 Diabetes in its Historical and Social Context many cases
- The immunomodulatory effects of vitamin D and the preventive effect of pharmacological (hypercalcemic) doses of ,25dihydroxyvitamin D on diabetes development in experimental animals have been documented in several studies.
- Despite previous indications from two prospective studies that serum α -tocopherol (vitamin E) could be associated with lower risk of T1DM, there was no association with advanced islet autoimmunity or T1DM in early life
- Perinatal factors and postnatal growth Off spring of mothers without diabetes aged 35 years or more when giving birth have a ~20–30% increased risk compared with offspring of mothers who are aged 25 years or less.
- Birth by cesarean section has been associated with a ~20% increased risk of T1DM in children according to a meta analysis of 20 published studies
- Increased birth weight has been associated with a relatively weak but significant increase in risk of childhood-onset T1DM

Epidemiology of Type 2 Diabetes

Key points

- The prevalence of type 2 diabetes mellitus (T2DM) is increasing worldwide.
- Approximately 415 million people worldwide had diabetes in 2015, making it one of the most common non-communicable diseases globally.
- The largest increase is observed in regions with rapidly developing economies and urbanization.
- The aging population, with an increase in the proportion of people aged >65 years in most countries, has contributed significantly to this increase in prevalence.
- The age of onset of diabetes is also decreasing in many countries, giving rise to an increasing proportion of young people of working age being affected by the disease.
- Several risk factors are known to be associated with increased risk of T2DM. Many of these risk factors are associated with a Westernized lifestyle .

- The regions with the highest diabetes prevalence rate at present are in the Pacific Islands and Middle East.
- The largest increase in diabetes prevalence is predicted to occur in China and India.
- Diabetes is associated with approximately two fold increased mortality in most populations, with the excess risk decreasing with increasing age.

Risk factors for T2DM

1. Dietary factors that increase the risk for T2DM include the following

- increased fat intake.
- increased intake of red and processed meat.
- consumption of fried food.
- increased intake of white rice.
- sugar-sweetened beverages.
- increased fruit and vegetable intake.
- a Mediterranean diet pattern.
- fermented dairy products.
- intake of oily fish.
- tea.

2. Obesity THE REAL NIGHTMARE

- Obesity accounts for 80–85% of the overall risk of developing T2DM, and underlies the current global spread of the disease [6].
- The risk of T2DM increases as the body mass index (BMI) increases above 24 kg/m²,
- Although central obesity is a particularly strong factor, it can impart further risk regardless of the overall level of general obesity.
- Obesity, particularly central adiposity, is associated with insulin resistance, and also β -cell dysfunction, partly through increased free fatty acids and lipotoxicity .
- Obesity is also associated with other metabolic abnormalities such as dyslipidemia and hypertension
- metabolic syndrome (X)
- The clustering of some of the risk factors, namely hypertension, elevated blood glucose, elevated triglyceride, low high-density lipoprotein (HDL) cholesterol, and abdominal obesity, is termed the metabolic syndrome.
- Presence of the metabolic syndrome, according to the definition, is associated with a 2–5-fold increased risk of developing diabetes in most populations

3.family history

- A positive family history is an important risk factor for T2DM.
- In the Inter Act case–cohort study, a family history of T2DM was associated with a 2.7-fold risk of incident diabetes

Traditional risk factors

- increasing age,
- adiposity,
- physical inactivity,
- dietary factors,
- positive family history,
- presence of other cardiometabolic risk factors.
- Recent emerging risk factors
- Sugar-sweetened beverages
- Decreased sleep
- Depression and treatment of depression
- Drug-induced metabolic changes
- Environmental toxins
- Low birth weight and fetal malnutrition
- Maternal obesity, maternal hyperglycemia

Increase in the prevalence of T2DM.

- changes in the ratio of diagnosed to undiagnosed cases of diabetes;
- population demographic changes with an aging population;
- earlier age at onset of diabetes;
- longer survival in people with diabetes;
- Increasing incidence of diabetes.

Prevalence of DM based on stepwise survey in the Eastern Mediterranean region:

Iraq				10.5%
Jordan				12%
Iran				10.3%
Saudi		Arabia		23%
United	Arab		Emirates	25%
Kuwait	24%			

- According to the latest WHO data published in April 2011 Diabetes Mellitus Deaths in Iraq reached 1.02 % of total deaths.
- Prevention of T2DM
- Given the cost of diabetes, it is essential to prevent or delay the onset of diabetes and its associated complications.
- With improved understanding of the natural history of the development of T2DM and the role of various modifiable risk factors in its pathogenesis, a number of randomized clinical trials have examined the effect of lifestyle intervention to prevent T2DM

Several drugs used in the treatment of T2DM and obesity are effective in preventing diabetes

Including:

- metformin,
- thiazolidinedione
- acarbose,
- orlistat,
- and insulin itself
- In addition, several clinical trials indicated that angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers may reduce incident diabetes in high-risk people with hypertension.

Screening :

- Fasting glucose is the screening method of choice.
- Although a random glucose is acceptable.
- HbA_{1c} is not recommended as a screening test due to the lack of standardization.

To whom we are going to screen??

All individuals with previous risk factors Should be screened.

Women with the following risk factors usually require screening for gestational diabetes

1. Age older than 25 years.
2. High-risk racial or ethnic group.
3. BMI of 25 or higher.
4. History of abnormal glucose tolerance test.
5. Previous history of adverse pregnancy outcomes usually associated with gestational diabetes.
6. Diabetes in a first-degree relative.