Lecture 4 **Dr: yaseen Ethawi**

Epidemiology of Diabetes Mellitus

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.

General Epidemiological Characteristics:

- **It affects large number of people; 250 millions are expected to be affected in 2015 and 300 million in 2025.**
- **It affects all ethnic and socioeconomic groups.**
- **Incidence and prevalence are highly varied between and within countries 20-60 folds difference.**
- **Considerable impact on economic and social condition.**
- **DM is an important cause of premature death and causes serious health consequences.**
- **It is important RF of CHD.**
- **CHD is the leading cause of death among diabetics.**
- **In developing countries, the incidence and prevalence of Type 2 DM are rapidly increasing mostly due to modernization of life style.**
- **In developing countries, mortality from acute complications is high due to lack of basic requirements.**

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

? Iraq 10.4%
? Jordan 12%
? Iran 10.3%
? Saudi Arabia 23%
? United Arab Emirates 25%
? Kuwait 24%

Classification of DM:
A- Primary
- Type 1 insulin dependent (IDDM)
- Type 2 non insulin dependent (NIDDM)
- Impaired glucose tolerance IGT .
.It is a metabolic state intermediate between normal glucose homeostasis and DM .
. IFG: Impaired fasting glycemia (fasting).
FPG: > 110 mg / dl-< 126 mg /dl .
Whole blood :>100 mg /dl- <110 mg/ dl .
-Normoglycemia .
.FPG < 110/ dl .
A symptomatic subject :
. A single abnormal test is not sufficient .
. At least one additional result within diabetic range , if it fails , then surveillance with periodic retesting taking in consideration ethnicity , family history , age , adiposity , and concomitant risk factors .
.Glycated Hb had similar sensitivity and specificity for glucose test
.OGTT is indicated if causal blood test is uncertain .
Diagnostic range .
.Fasting Plasma Glucose : 126 mg / dl .
. Whole blood : 110 mg /dl .
. In epidemiological studies FPG is sufficient or 2hr after 75 gm oral glucose load .
Diagnosis of DM:
.Test urine for glucose and ketones .
.measure random or fasting venous blood glucose . diagnosis confirmed by .
FPG ≥ 7.0 mmol /L (126 mg /dl)
RPG ≥ 200 mg /dl .
Indication for oral glucose tolerance test .
. FPG 110-126 mg /dl .
.RPG 140 – 198 mg / dl .
IGT Fasting (< 126 mg /dl) , 2hrs after 140-199 mg /dl .
DM fasting ≥ 126 mg /dl , 2hrs after ≥ 200 mg /dl .

-Type 2 :
.They have relative rather than absolute insulin deficiency with resistance to insulin action .
.they do not require insulin for survival .
.they may remain undetected for long time .
.they have
increased risk of macro and micro vascular complications .
.the autoimmune destruction dose not occur .
.ketoacidosis is infrequent .
.obesity is very common .
.insulin level could be normal or elevated .
.insulin sensitivity can be increase by decreasing weight .
Increasing physical and or pharmacologic treatment .
.the risk of this type increases with age , obesity , lack of physical activity .
.it is more in women with GDM and individuals with HT or Dyslidemia .
.Genetic predisposition is common .
Gestational hyperglycemia and diabetes .
It is CHO intolerance resulting in various severity of hyperglycemia with onset or first recognized during pregnancy .
.elevated fasting or postprandial plasma glucose level in the early pregnancy (first trimester , and first half of second trimester) indicates that DM antedate pregnancy .
.normal OGTT in early pregnancy does not exclude the possibility that GDM is not going to develop .
High risk groups .
.older women .
.women with previous history of large for gestational age baby .
.women from certain ethnic group .
.any women with elevated fasting or causal blood.
.it is better to screen such groups during the first trimester to detect previous undiagnosed DM .
.formal systematic testing for gestational DM is usually done between 24 and 28 weeks .
.after the pregnancy ends , the women should be re-classified as having :

DM, IGT, OR normal glucose tolerance based on OGTT done 6 weeks or more after delivery .
.women with GDM are at increase risk for subsequent DM.

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 =/> 150 mg/dl and /or low HDL –c <35mg /dl in males . <39mg/dl in females .
.central obesity waist : hip ratio : males >0.9 , females >0.85 .and or BMI > 30.
.microalbuminurea >/= 20 µg / min or albumin/ creatinin ratio >/= 30 mg / gm .
.other components : hyperuricemia , coagulation disorder .
.metabolic syndrome increase risk of macro vascular disorders .
.management should include control strategies of all components and not only hyperglycemia .
.metabolic syndrome may be present for up to 10 years before detection of the glycemic disorder .

B- Secondary:
- Malnutrition related
- Gestational DM

NIDDM is the commonest form contributing to 90-95% patient load.

Etiology:
Agent factors:
? Pancreatic disorders.
? Defect in the formulation of insulin (Acromegaly, Cushing s syndrome, and hyperthyroidism).
? Destruction of Beta cells (Viral infection, Chemical).
? Medications (corticosteroids, thiazide, phenytoin)

Host factors:
? Age: usually manifests above 40 years in type 2 DM. Start early around 10 years in type 1DM.
? Sex: risk is equal in both sexes.
? Sedentary lifestyle: lack of exercise alters interaction between insulin and its receptors leading to NIDDM.
? Viral infections: such as Mumps, Rubella, Cocksakie B4, Epstein-Barr virus.
? Obesity: produce resistance to action of insulin.
? Physical stress, surgery, trauma.
? Genetic factors: IDDM shows strong association with HLA haplotypes DR3 and DR4.
? DIET: Bovine serum albumin (major constituent of cows milk).
? Chemicals: nitrosamine, Alloxan, Streptolysin. Rodenticide.

Environmental factors:
Multiple factors like occupation, economic status, educational levels, urbanization and changes in the lifestyle are clearly implicated in diabetes mellitus. The earlier belief that DM is a disease of the upper socioeconomic class is no longer true.

Diabetes mellitus has almost equal prevalence in all cross section of the society.
DM is not a disease that can be cured; it is a lifelong metabolic disorder that is manageable only by sustained metabolic control. Perhaps no other disease requires a longer and closer doctor patients understanding than DM and greater patient participation in its management.

PRIMARY PREVENTION OF TYPE 1 DM:
It should be done before onset of type 1 pathological process. i.e.: before development of immunological markers

It is still EXPERIMENTAL

Because of the very low prevalence, it required screening test of high specificity and sensitivity, inexpensive and easy to perform.

Screening includes:
? Family history
? Genetic markers (HLA)
? Immunological risk markers
? Metabolic risk factor

Screening
Screening is costly and technically difficult
Those have these factors have 10 folds excess risk
Still 95-97% of them do not develop the disease later

Primary Prevention Strategy
? Deprivation of caw milk protein in the neonatal and early infancy.
? Administration of free radical scavenger.
? Allowing B-cell rest by administration of early insulin treatment.
? Encouraging the development of Antigen tolerance by administration of early insulin treatment.
? Immunosuppression or Immunomodulation

PRIMARY PREVENTION OF TYPE 2 DM
No population based studies on primary prevention of type 2 DM.
Prevention should be based on efforts to decrease insulin resistance and promotion of insulin secretion.

Life-style measures that decrease insulin resistance:
? Correction and prevention of obesity.
? Avoidance of high fat diet.
? Encouraging using unrefined sugar and soluble fibers.
? Avoidance or cautious use of diabetogenic drugs.
? Encourage physical activity.

SECONDARY PREVENTION OF TYPE 2 DM
Aims at retarding progression of DM, decreases risk or severity of complications and so decreases premature morbidity and mortality
? Screening for undetected DM

? Control of hyperglycemia, and other metabolic abnormalities
? Correction of other cardiovascular risk factors (smoking, dyslipidemias, obesity).

Screening approaches:
? Population approach
? Selective screening: on high risk individuals
? Opportunistic screening: most appropriate and highly cost effective

TERTIARY PREVENTIONOF TYPE 2 DM
Aims at decreasing morbidity and mortality by delaying or arresting the complications
Good glycemic control (by intensive treatment, frequent monitoring of blood glucose level) slow or arrest development of early microvascular complications

EDUCATION OF DIABETIC PATIENTS
It is the corner stone of DM management
It covers:
? Self care.
? Changing behavior to prevent and control of complications.
? Encourage interaction with health care providers.

Contents of Educational Program
Nature of disease, types, clinical presentation, diagnosis, complications, types of treatment, side effects, exercise, self monitoring, avoidance and recognition of hypoglycemia, and hyperglycemia, foot care, pregnancy and obstetric care, avoidance of smoking, cardiovascular risk factors, need for follow up, self management skills and attitudes.
Active participation of the family is vital in DM management

Types of education methods

? Individual counseling
? Group teaching
? Educational materials: posters, pamphlets, books…
? Special educational programs are needed for special groups as children and pregnant women