***Diabetes mellitus***

***Definition***: Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces. Hyperglycemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels.

The American Diabetes Association (ADA)/World Health Organization (WHO) guidelines recommend the following categories of diabetes:

■ Type 1 diabetes

■ Type 2 diabetes

■ Other specific types of diabetes

■ Gestational diabetes mellitus (GDM)

***Type 1diabetes:***

* previously termed insulin-dependent diabetes
* Age is usually below 40 years (Juveniles).
* it results from a cellular-mediated autoimmune destruction of the β-cells of the pancreas leading to absolute insulin deficiency
* Markers of the immune destruction of the β-cell include islet cell autoantibodies, insulin autoantibodies.
* It accounts for 10% of all cases of diabetes.
* It is a severe form of diabetes and patients are prone to develop diabetic ketoacidosis.

***Type 2 diabetes (non isulin dependent diabetes)***

-Age is usually above 40 years (adults).

-caused by a combination of insulin resistance and β cell insulin secretory dysfunction

-There is relative insulin deficiency.

-The secretion of insulin is normal, increased, or decreased.

-The increased β-cell demand induced by insulin resistance is associated with a progressive loss of β-cell function that leads to development of fasting hyperglycemia .

- There is familial tendency.

- It accounts for 80 – 90 % of all cases of diabetes.

- It is a mild form of diabetes.

-The predisposing factor or risk factors for this type of diabetes are obesity, sustained stress, and sedentary life style.

***Other specific types of diabetes***

A. Genetic defects of β-cell function

B. Genetic defects in insulin action e

C. Diseases of the exocrine pancreas e.g.Pancreatitis,traumapancreatectomy ,Neoplasia,Hemochromatosis

D. Endocrinopathies: Acromegaly, Cushing’s syndrome, Hyperthyroidism.

E. Drug or chemical induced Glucocorticoid ,Thyroid hormone

F. Infections Congenital rubella Cytomegalovirus

G. Other genetic syndromes sometimes associated with diabetes: Down syndrome, Klinefelter syndrome, Turner syndrome.

* ***Gestational diabetes (GDM):*** is “any degree of glucose intolerance with onset or first recognition during pregnancy”. Causes of GDM include metabolic and hormonal changes. Patients with GDM frequently return to normal postpartum. However, this disease is associated with increased perinatal complications and an increased risk for development of diabetes in later years.

***Complications of diabetes***

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| **Complications of diabetes** | |
| **Acute complications** | **Chronic complications** |
| * Diabetic ketoacidosis. * Hyperglycemic hyperosmolar non ketotic coma. * Hypoglycemia. * Lactic acidosis. | ● Microvascular complications:  - Diabetic retinopathy.  - Diabetic nephropathy.  - Diabetic neuropathy.  ● Macrovascular complications:  - Atherosclerosis. - Stroke.  - Coronary artery disease. - Diabetic foot  - Peripheral vascular disease. |

1. **Diabetic ketoacidosis**:

- It may be precipitated by infection or vomiting.

-There is severe insulin deficiency, increased lipid and protein

breakdown, and enhanced hepatic gluconeogenesis and impaired

glucose entry into cells.

-It is very common in type 1 diabetes and may the first presentation

-There is increase in free fatty acids and ketone bodies.

-Hyperglycemia leads to osmotic diuresis, polyuria with loss of

electrolytes. Also mild uremia due to volume depletion.

-Cellular dehydration affects cerebral cells leading to confusion and

coma.

-Acidosis that leads to low bicarbonate level.

-Hyperkalemia due to shift of K+ from cells into plasma.

-Ketoacidosis leads to deep sighing respirationand the odor of acetone.

**2- Hyperosmolal non-ketotic coma:**

- It occurs in very elderly patients and in type2 diabetes

- It is a condition in which there is marked hyperglycemia but no

detectable ketoacidosis.

- It has been suggested that insulin activity is sufficient to suppress

lipolysis but insufficient to suppress hepatic gluconeogenesis or to

facilitate glucose transport into cells.

- Plasma glucose concentration may exceed 900 mg/dL.

- There is increase in plasma osmolality.

- There is also severe dehydration.

***Chronic complications***

* Vascular disease is a common complication of diabetes mellitus.

1. Macrovascular disease due to abnormalities of large vessels and may present as coronary artery, cerebrovascular or peripheral vascular insufficiency.
2. Microvascular disease due to abnormalities of small blood vessels particularly affects the retina (diabetic retinopathy) and the kidney (diabetic nephropathy).

***Diagnosis of diabetes***

**Oral glucose tolerance test:**

**Precautions:**

1. Moderate physical activity for 3 days before doing the test.
2. Stop medications that affect glucose tolerance as steroids, contraceptive pills and diuretics.
3. The patient must be completely seated and no smoking is allowed during the test.
4. The patient fasts overnight 8-10 hourswater only allowed.

**Technique:**

1. Fasting blood and urine samples are taken.
2. Give the patient 75 g glucose / 200 ml water for adult.
3. Collect blood and urine samples every ½ hour for 2½ hours after oral glucose intake.
4. For blood samples glucose assays must be done and for urine sample both glucose and ketone bodies testing must be performed.

**Interpretation:**

***Normal*** fasting serum glucose form 70-110 mg/dL.

***Prediabetics:***those who will develop diabetes within 2 years,they need no treatment and only weight reduction and control of diet

**Impaired fasting glucose:**

Fasting blood glucose between 100 and 125 mg/dl.

**Impaired glucose tolerance (IGT)**

2h post prandial values 140 mg/dl to 199 mg/dl

***Diabetic oral glucose tolerance curve:***

* Fasting serum glucose ≥ 126 mg/dL.

- 2 hours post prandial≥ 200 mg/dL