Diabetes mellitus

Diabetes mellitus:

Definition: Diabetes mellitus is a metabolic disorders characterized by hyperglycaemia with or without glycosuria due to absolute or relative deficiency of insulin.

Classification:

i. Type I or insulin dependent diabetes mellitus (IDDM):

- Immune mediated
- Idiopathic

ii. Type II or non insulin dependent diabetes mellitus (NIDDM)

- Insulin resistance.
- Pancreatic beta -cell failure.

iii. Other specific types:

- Genetic defects of beta cell function.
- Genetic defect of insulin action.
- Pancreatic disease :
    - Pancreatitis.
    - Pancreatectomy.
    - Neoplastic disease
    - Cystic fibrosis
    - Haemochromatosis
    - Fibrocalculous pancreatopathy.
- **Excess endogenous production of hormonal antagonists to insulin:**
    - GH hormone-Acromegaly
    - Glucocorticoid -Cushing's syndrome.
    - Glucagon-Glucagonoma
    - Catecholamines-Phaeochromocytoma.
- Thyroid hormone -thyrotoxicosis

• **Drug induced**: Corticosteroid, thiazide diuretics, phenytoin

• **Viral infections**: Congenital rubella, mumps, Coxackie virus B.

• **Uncommon forms of immune-mediated diabetes**.

• **Associated with genetic syndromes :**

- Down's syndrome.
- Klinefelter's syndrome
- Turner's syndrome
- DIDMOAD / Wolfram's syndrome :

(Diabetes insipidus, DM, optic atrophy, nerve deafiaess)

iv. Gestational diabetes mellitus.

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The diagnostic criteria for diabetes mellitus recommended by

Diagnosis of diabetes mellitus:

Patient complains of symptoms suggesting diabetes

- Test urine for glucose and ketones
- Measure random or fasting blood glucose. Diagnosis

Confirmed by -

- Fasting plasma glucose > 7.0 mmol/ L (126 mg/dl)
- Random plasma glucose > 11.1 mmol/L(200 mg/dl)

Indications for oral glucose tolerance test

- Fasting plasma glucose 6.1-7 .0 mmol/L (110-126 mg/dl)
- Random plasma glucose 7.81-11.0 mmol/L (140-199mg/dl)

Oral glucose tolerance test: WHO diagnostic criteria

i. Diabetes :

- Fasting > 7.0 mmol/ L (126 mg/dl)
- 2 hrs after glucose load > 11.1 mmol/L(200 mg/dl)

ii. Impaired glucose tolerance (IGT):

- Fasting: 6.1-6.9 (< 7.0) mmol/L
- 2 hrs after glucose load: 7.8-11.0 (140-199) mmol/L

Note:

Insulin resistance syndrome / metabolic syndrome:

- Type II diabetes is often associated with other medical disorders including obesity, HTN & Hyperlipidaemia, all of predispose to cardiovascular diseases.
- This is known as metabolic syndrome or syndrome X where primary defect is insulin resistance.

Clinical feature of IDDM (Type -I) & NIDDM (Type- II):

Traits	IDDM (Type -I)	NIDDM (Type- II)
1.Age of onset:	Usually < 40 years	> 50 years
2.Duration of symptoms :	Weeks	Months to years
3.Body weight :	Normal or low	Obese.
4.Ketonuria :	Yes	No
5. Rapid death without treatment with insulin.	Yes	No
6.Auto antibodies	Present (againstpancreatic cells)	Absent

7. Diabetic complication	Absent	Present in 25% cases
8.Fmily history of DM	Uncommon	Yes
9.Acute complication	Diabetic ketoacidosis	Hyperosmolar nonketotic coma
10.Other autoimmune	Yes	Uncommon.

Clinical feature:

i. Asymptomatic.

ii. Symptomatic case:

- Polyuria
- Polydipsia.
- Polyphagia.
- Weight loss.
- Fatigue
- Pruritus vulvae or balanitis .
- Dryness of the mouth & throat.

iii. Pts may come with features of complication:

- Diabetic retinopathy (visual blurring), nephropathy (with oedema).
- Features of neuropathy: Pain, paraesthesia, muscle wasting, or loss of ankle
- Reflexes, loss of vibration.
- Ulcer with delayed healing.
- Fungal infection (skin) & urinary tract infection.
- Unconsciousness due to hypoglycaemia, ketoacidosis, hyperosmolar nonketotic
- Coma, lactic acidosis.
- Stroke
- MI & peripheral gangrene.

Investigation

1. Urinalysis:

- Ketonuria (Rothares test)
- Glycosuria. (Benedict's test)

ii. Blood glucose level:

- Fasting plasma glucose > 7.0 mmol/L(126mg/dl)
- Random plasma glucose > 11.1 mmol/L(200 mg/dl).

iii. Blood urea & serum creatitine .

iv. Serum electrolytes

v. Blood gases.

vi. Blood & urine C/S.

vii. CBC - leukocytosis

viii. X ray chest.

ix. ECG

x. HbAlc

Rx of Diabetes mellitus:

Principles of management-'3D' :

- Discipline
- Diet
- Drugs

1. Discipline (Education):

- Daily routine of exercise.
    1. 30 min exercise
    2. Best exercise :swimming, Cycling, Walking
- Avoid sedentary activity.
- Timely diet.
- Balanced diet.
- Particulars about drugs.
- Avoidance of food which is not recommended.
- Regular check up blood pressure.
- Regular follow up.

2. Dietary Mx:

Types of diabetic diets:

***** Plate model: 2/5 th:-stable food(rice, potato)**

2/5 th:-vegetable, fruits

1/5 th:-fat, protein

I) Low energy, weight-reducing diet:

- Reduce 500 KCal of daily requirement.
- Reduce wt. 0.5 kg / weekly.
- A diet of 1000 kcal/day (1500 kcal in active person).

II). Weight maintenance diet:

- High **CHO.**
- Reduce fatty diet.

Nibbling:

- Say weight 60 kg, so energy needed 1200 kcal. Now, it is given on the course of the day.
- .Example -
    - **3 main meals -**
        - Morning: 2 slice bread + 1 egg + vegetables + dal
        - Midday : 1.5 plate rice + vegetables +fish +meat + dal
        - Night: 3 slice bread + vegetables + dal.
    - **In each of 3 snacks (eg at 11 am, 5 pm and 11 pm):**
        - 2 piece, protein hiscuit; or 1 small-banana + 1 biscuit.
    - Milk without cheese, 0.5 litre in the course of the day.

3. Drugs:

Type-l(IDDM):

- **Non obese**: Weight maintenance diet + Insulin
- **Obese**: Low-energy diet + Insulin

Examples of recommended insulin regimens:

- **Multiple injections (basal bolus):**
  - -Short acting insulin before meals.
  - -Intermediates or long acting insulin, once or twice daily.
- **Twice-daily insulin in combination:**
  - -Soluble or fast acting analogue.
  - -Isophane or longer acting analogue.
- **Continuous subcutaneous insulin injection**.

Type-2 (NIDDM):

- **Non-obese**: Weight maintenance diet ± Sulphonylureas (Monotherapy)

  Combination therapy:

  Sulphonylureas + metformin or add
  - Acarbose
  - Rosiglitazone or pioglitazone
  - Bedtime isophane insulin or long acting insulin.
- **Obese**: Low energy diet ± Metformin (Monotherapy)

  Combination therapy:

  Sulphonylureas + metformin or add
  - Acarbose
  - Rosiglitazone or pioglitazone
  - Bedtime isophane insulin or long acting insulin.

Complication:

a. Acute complications:

- Hypoglycaemia coma.
- Diabetic ketoacidosis
- Non ketotic hyperosmolar diabetic coma
- Lactic acidosis
- Acute circulatory failure.

b. Chronic complications:

Microvascular/ Neuropathic:

i. Retinopathy, cataract

- Impaired vision

ii. Nephropathy:

- Renal failure.

iii. Peripheral neuropathy:

- Sensory loss
- Motor weakness.

iv. Autonomic neuropathy:

- Postural hypotension
- GIT problems

v. Foot disease:

- Ulceration
- Arthropathy.

Macrovascular:

i. Coronary circulation:

- Myocardial ischaemia/ infarction

ii. Cerebral circulation:

- TIA
- Stroke

iii. Peripheral circulation:

Claudication

- Ischaemia

Possible Nursing care plan

Nursing Diagnosis	Goals / Outcome	Intervention/ Nursing activity	Evaluation
Alteration body temperature (102°F)due to disease condition	To reduce temperature	1. Assess the patient condition. 2.Monitor vital signs 3. Assess skin color and temperature. 4. Monitor WBC and other pertinent laboratory records. a. Elevated wbc levels indicate presence of infection.. 5. Remove excess blankets when the client feels warm; provide extra warmth when the client feels chilled. 6.Provide adequate foods and fluids. To provide additional calories and to prevent dehydration. 7.Measure Intake and Output. 8.Maintain prescribed IV fluids as ordered by the physician. 9.Promote rest. To reduce body heat production. 10.Provide good oral hygiene. To prevent herpetic lesions of the mouth. 11.Provide cool, circulating air using a convection. 12.Provide dry clothing and bed linens. To ensure comfort. 13.Provide TSB (Temperature of water 80-98°F). To enhance heat loss by evaporation and conduction. 14.Administer antipyretics as ordered. Temperature of 38.5°C and above usually require administration of antipyretic. 15. Given mental support patient and patient attendance.	Gradually remove the temperature (99°F).comfortable patient fell c

Nursing Diagnosis	Goals / Outcome	Intervention/ Nursing activity	Evaluation
Ulcer in the foot due to disease condition	To reduce infection and to promote healing of ulcer	1. Assess the patient condition. 2. Maintain asepsis during IV insertion, administration of medications, and providing wound or site care. 3. Observe for the signs of infection and inflammation: fever, flushed appearance, wound drainage, purulent sputum, and cloudy urine. 4. Teach and promote good hand hygiene. 5. Observe for the signs of infection and inflammation: fever, flushed appearance, wound drainage, purulent sputum, and cloudy urine. 6. Provide catheter or perineal care. Teach Male patients to clean from front to back after elimination. 7. Given mental support patient and patient attendance.	

Nursing Diagnosis	Goals / Outcome	Intervention/ Nursing activity	Evaluation
Weakness due to nutritional imbalance	To maintain nutritional balance	1. Given soft liquid and digestible food. 2. Given high protein foods. 3. Given diabetic food as per doctor order. 4. Given medication as per doctor's order. 5.Given Mental support patient and patients attendance	To improve nutritional balance. .

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