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Sl.no.	Sub	Paper code	Topic	Format	Name	Contact Details
1	Home Sc.	HOM CC 5	Diabetes	PDF	Dr. Punam Kumari	PG Dept.of H.Sc. MMC,PU,PAT. Mob:9430512546

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Therapeutic Nutrition - CC5

Unit IV

Diabetes Mellitus

Diabetes Mellitus known as 'Diabetes'. It is a group of metabolic disorders that prevent the body to utilize glucose completely or partially. It is characterised by high blood sugar levels and alteration in carbohydrate, protein and fat metabolism. It is a serious ailment caused by the failure of the organ pancreas in our body to produce the hormone "insulin". Insulin is produced by the Beta-cells of the **Islets of Langerhans** and it is essential to carry out carbohydrate metabolism.

It occurs when:

1. The pancreas is no longer able to produce insulin.
2. The body cannot make use of the insulin it produces.

Blood Sugar Range:

- 80 – 120 mg → Normal

- 120 – 160 mg → Medium(Hyperglycaemia)
- 160 – 240 mg → High
- 240 – 400 mg → Severe (Glycosuria)

Diabetes Mellitus in the World

The global diabetes prevalence in 2019 is estimated to be 9.3% (463 million people), rising to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045. Government survey 2019 found 11.8% prevalence of diabetes in India.

Types of Diabetes

Type I Diabetes Mellitus (IDDM)

Type 1 Diabetes known as juvenile onset diabetes and occurs suddenly in younger age (6-14 years). In this disease, the body makes little or no insulin. Daily injections of insulin are needed. The exact cause is unknown. But genetics, viruses, and autoimmune problems may play a role. 5-10% of the total persons with diabetes suffer from IDDM (Insulin Dependent Diabetes Mellitus).

Type II Diabetes Mellitus (NIDDM)

Type II Diabetes Mellitus (Non-Insulin Dependent Diabetes Mellitus) is known as adult onset diabetes .It is usually milder and more stable and the most common form of diabetes accounting for 90-95% of patients with diabetes. The pancreas does not make enough insulin to keep blood glucose level normal or production of insulin is there but it is not working properly.

Gestational diabetes

Gestational diabetes develops during pregnancy, usually in the later stages. It disappears immediately after the baby is born

Symptoms of Diabetes:

- Frequent urination (**polyuria**)
- Frequent hunger (**Polyphagia**)
- Increased thirst (**Polydipsia**)
- Unexplained weight loss

- Presence of ketones in the urine (ketones are a by-product of the breakdown of muscle and fat that happens when there's not enough available insulin)
- Fatigue
- Irritability
- Blurred vision
- Slow-healing sores
- Frequent infections, such as gums or skin infections and vaginal infections

Factors Contributing to Diabetes:

- **Heredity** – It plays the most important role in contributing the diabetes. Risk increases if a parent or sibling has type 1 diabetes.
- **Environmental factors** - Circumstances such as exposure to a viral illness likely play some role in type 1 diabetes.
- **Obesity** – The risk of getting diabetes is greater among obese person. The fatty tissue have resistant to the action of insulin.
- **Inactivity** - The less physical activity increases the risk of diabetes
- **Race** - People of certain races — including black people, Hispanics, American Indians and Asian-Americans — are at higher risk.
- **Age** – Diabetes occurs at any age .Usually it is common in middle age (42-45 years) .**Risk increases as one gets older.**
- **Sex** - Diabetes, especially type 2, is more common in males rather than females. However, females often have more serious complications and a greater risk of death.
- **Pregnancy** - Gestational diabetes is associated with multiple adverse pregnancy outcomes.
- **High blood pressure.** Having blood pressure over 140/90 millimetres of mercury (mm Hg) is linked to an increased risk of type 2 diabetes.
- **Abnormal cholesterol and triglyceride levels-**

People with **low** levels of high-density lipoprotein (HDL), or "good," cholesterol have higher risk of type II diabetes and with high levels of triglycerides have an increased risk of type II diabetes.

- **Stress**-Stress also contributes to the development of diabetes.
- **Geography** - Certain countries, such as Finland and Sweden, have higher rates of type 1 diabetes.
- **Alcohol**- Excessive intake of alcohol can increase the risk of diabetes by damaging pancreas and liver cells.

Treatment of Diabetes

{A} **Diet management**

{B} **Exercise**

{C} **Drug therapy**

(A) Diet management:

Dietary measure should be used to control blood glucose and to minimise the risk of hypoglycaemia and reduce the long term complications.

Energy: Based on the age, sex, weight and physical activity appropriate caloric requirement should be given. Nevertheless, make sure to allocate 50-60% of total calories from carbohydrates, 15-20% total calories from protein and 30% total calories from fats.

- **Carbohydrates:** Carbohydrates are one of the chief macronutrient that directly affects the blood glucose levels more than any other nutrients. Hence, carbohydrates of high glycaemic in nature such as refined grains (white rice, semolina and white **flour (Maida)**) must be substituted with whole grains or other healthy carbohydrate sources. However, Carbohydrate restricted diet is recommended and should be maintained to 60-65 per cent of total calories. It should be given in form of polysaccharides.
- **Protein:** A high Protein diet is recommended because it supplies the essential amino acids needed for tissue repair. The recommended protein intake

should be 1g/kg for adults. Foods rich in protein such as egg, chicken, meat, milk and milk products, dhal, whole grains, nuts are recommended.

- **Fat:** Low fat diet is recommended because it increases insulin binding and reduces LDL and VLDL levels that are responsible to reduce atherosclerosis of diabetic person. Polyunsaturated fat should be given. Fat content should be 15-20 per cent of total calories.
- **Vitamin and Mineral supplementation:** It is best to consume fresh fruits and vegetables rich in vitamin C and E. Magnesium and Zinc should also be encouraged. Regular monitoring of potassium levels for individuals recovering from diabetic ketoacidosis is highly essential where supplementation of potassium is necessary if the levels are low. Since, low level of vitamin D is associated to impaired glucose tolerance; ensure adequate supply of Vitamin D in the diet. Special care should be given in order to prevent any further complications that arise due to vitamin and mineral deficiencies.
- **Dietary fibre:** Foods rich in fibre such as whole grains like brown rice, barley, bulgur wheat, legumes, whole fruits, vegetables including leafy vegetables may prove beneficial. An intake of about 25-40g of fibre is suggested.
- **Sweeteners:** Non-nutritive sweeteners such as aspartame, stevia, sucralose are considered to be safe provided it must be taken in limited quantity. These sweeteners may not necessarily be added in the diet as majority of them can manage well without the addition of sweeteners.
- **Salt:** Salt intake must be restricted to 5g/day and can be further reduced to 2.4g/day on the onset of hypertension or nephropathy. Restriction of salty foods such as pickles, papad, sauces, canned and processed foods etc. should be done.

{B} Exercise

Exercise lowers blood glucose levels and boosts body's sensitivity to insulin, countering insulin resistance.

{C} Drug therapy

Insulin and oral-antidiabetic drugs must be taken to control the diabetes as prescribe by physician. As type 1 diabetes is best managed with

intensive insulin therapy, it is highly essential to distribute the calories according to the type and dose of insulin given. One should also be very careful about the timing of their meals, which if not followed can lead to hypoglycaemia.

Foods Included:

Whole grains, green vegetables, fruits such as apple, mangoes, and papaya should be given according to food exchange list.

Foods to be avoided:

Sugar, jaggery, sweets, jam, jelly, glucose, honey, syrup, dried fruits, cake, pastry, alcohol etc.

Food Exchange list

The diet for diabetic patient is prescribed in term of exchange lists. Food exchange lists are group of measured food of the same calorific value and similar protein, fat and carbohydrates can be substituted for another in a meal plan.

Nature of diet - carbohydrate restricted.

One Day Menu Plan

- Early Morning - One cup tea without sugar
- Breakfast - Brown bread (2-slice) one cup skimmed milk, one boiled egg
- Lunch - Chapatti (2), one cup plain dal, one cup rice, one cup mixed vegetable ,sprouted salad.
- Evening - Dhokla (2 pcs), one cup orange juice.
- Dinner - Missy roti (2 pcs.), Moong dal(one cup)/one bowl Chicken, one cup bitter guard vegetable.
- Bede time - One glass skimmed milk.

Ref.Books :

- (1) Dietetics –by B.srilakshmi
- (2) Nutrition and Dietetics -by Shubhangini A Joshi
- (3) A Textbook of Foods, Nutrition and Dietetics - by Raheena Begum.
- (4) Principles of Nutrition & Dietetics by M Swaminathan

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