



Review Article

A Review on Diabetes Mellitus

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ABSTRACT

Diabetes Mellitus (DM) is a metabolic disorder characterized by chronic hyperglycemia, resulting from insulin deficiency, insulin resistance, or both. This overview provides an in-depth examination of DM, including its definition, classification, diagnosis, prevention, and management. The classification section explores Type 1, Type 2, gestational, and other specific types of diabetes. Diagnosis methods, including venous plasma glucose and HbA1c tests, are discussed. Prevention strategies, such as physical activity and diet and lifestyle modifications, are outlined. Management options, including insulin therapy, oral medications, and monitoring and follow-up, are comprehensively reviewed. This overview aims to provide a thorough understanding of DM, facilitating effective prevention, diagnosis, and management of the disease.

INTRODUCTION

Diabetes Mellitus (DM) is a group of metabolic disorders characterized by chronic hyperglycemia (high blood sugar). This occurs due to insulin deficiency, insulin resistance, or a combination of both. Insulin is essential for regulating glucose, fat, and protein metabolism, and when its function is impaired, it leads to disturbed metabolism and elevated blood sugar levels^[1].

As the disease progresses, tissue and vascular damage can occur, resulting in serious complications such as:

- Retinopathy (eye damage leading to blindness)

- Neuropathy (nerve damage, especially in the extremities)
- Nephropathy (kidney damage)
- Cardiovascular issues (heart disease, stroke)
- Ulceration (particularly in the feet)

Diabetes is a heterogeneous condition, meaning it covers several types, including Type 1, Type 2, and gestational diabetes, each with different causes and disease progression. Proper management is essential to control blood sugar and prevent complications^[2]

Classification

1. Type 1 Diabetes:

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Cause: Autoimmune destruction of insulin-producing β -cells, leading to total insulin deficiency [3].

Associated Conditions:

Latent Autoimmune Diabetes in Adults (LADA): A slower-progressing form of Type 1 diabetes in adults [4].

2. Type 2 Diabetes:

Cause: A combination of insulin resistance (cells don't respond to insulin) and insulin deficiency (insufficient insulin production) [5]

Associated with: Metabolic syndrome (obesity, high blood pressure, etc.) [6]

3. Other Specific Types:

Exocrine Pancreatic Diseases: Conditions like pancreatitis, cystic fibrosis, and hemochromatosis affecting insulin production [7].

Endocrine Disorders: Conditions like Cushing's syndrome, acromegaly, and pheochromocytoma can lead to diabetes [8].

Genetic Defects: Conditions like MODY (Maturity-Onset Diabetes of the Young) affect insulin production or action [9].

Drug-Induced: Medications like glucocorticoids, neuroleptics, and interferons can cause diabetes [10].

Infections: Some viral infections can damage the pancreas, leading to diabetes [11].

4. Gestational Diabetes:

Cause: Occurs during pregnancy due to insulin resistance, often resolving after childbirth but increasing the risk of Type 2 diabetes later in life [12].

Diagnosis

1. Venous Plasma Glucose [1,13]:

- **Occasional Plasma Glucose:**

A random or casual plasma glucose value of ≥ 200 mg/dl (or ≥ 11.1 mmol/l) is considered diagnostic for diabetes, regardless of the time of day or the last meal.

- **Fasting Plasma Glucose (FPG):**

A fasting plasma glucose level of ≥ 126 mg/dl (or ≥ 7.0 mmol/l) after fasting for 8-12 hours is diagnostic of diabetes.

- **Oral Glucose Tolerance Test (OGTT):**

A 2-hour plasma glucose value of ≥ 200 mg/dl (or ≥ 11.1 mmol/l) after a 75g oral glucose load is diagnostic of diabetes. This test is particularly useful in cases where prediabetes or abnormal glucose tolerance is suspected.

2. HbA1c (Glycated Hemoglobin) [1]:

- An HbA1c value of $\geq 6.5\%$ (or ≥ 48 mmol/mol Hb) is diagnostic of diabetes. HbA1c reflects the average blood glucose levels over the past 2-3 months, making it an effective tool for both diagnosis and long-term monitoring.

Prevention

- **Physical Activity:** Regular exercise improves insulin sensitivity and reduces the risk of T2DM [14].

- **Diet and Lifestyle Modifications:** Weight loss, healthier eating, and exercise are crucial for preventing diabetes and improving metabolic health [15].

Management

Insulin Therapy [1]:

- **Basal Insulin:** Long-acting insulin that provides a steady, background level of insulin throughout the day and night, helping to maintain blood glucose levels between meals and overnight.

- **Bolus Insulin:** Short-acting insulin taken before meals to control postprandial glucose spikes (blood sugar rise after eating).

- **Premixed Insulin:** A combination of basal and bolus insulin in a fixed ratio, designed to provide both background insulin and coverage for meals in a single injection.

Oral Medications [16,17,18,19]:

Common treatments for T2DM include:

- **Sulfonylureas:** Stimulate insulin release.

- **Metformin (Biguanides):** Improve insulin sensitivity.



- Alpha-glucosidase inhibitors: Slow carbohydrate absorption.
 - Thiazolidinediones: Enhance insulin sensitivity.
 - DPP-4 Inhibitors: Increases insulin release and decreases glucagon levels.
 - GLP-1 Receptor Agonists: Enhances glucose-dependent insulin secretion and suppresses glucagon secretion.
 - SGLT2 Inhibitors: Reduces glucose reabsorption in the kidneys, increasing glucose excretion.
- Monitoring and Follow-up ^[1]:
- Blood Glucose Monitoring: Regularly checking blood glucose levels to guide adjustments in treatment and ensure glucose control is within target ranges.
 - HbA1c Testing: Quarterly testing to evaluate long-term blood glucose control by measuring the average glucose levels over the past 2-3 months.
 - Regular Health Check-ups: Periodic visits to healthcare providers to monitor for complications associated with diabetes (such as heart disease, kidney damage, and neuropathy) and to make adjustments to treatment as necessary.

CONCLUSION

Diabetes Mellitus is a serious health issue increasingly affecting people worldwide. Lifestyle factors and daily habits play a key role in the development of this condition. This review highlights the complexity of diabetes and the need for a comprehensive approach to manage it effectively.

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