



Short Communication

Diabetes mellitus: A lifestyle disorder

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels, resulting from either insufficient insulin production or the body's inability to effectively utilize insulin. This condition has become a global health concern, with an increasing prevalence worldwide. This review article aims to provide an overview of diabetes mellitus, its diagnostic criteria, and recent updates in management, complications, and a discussion on its implications for public health.

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1. Introduction

Diabetes mellitus is a complex and multifactorial disease that affects millions of individuals globally. It can be broadly categorized into three main types: Type 1 diabetes, Type 2 diabetes, and gestational diabetes. Type 1 diabetes is an autoimmune condition characterized by the destruction of insulin-producing beta cells in the pancreas, leading to an absolute deficiency of insulin. Type 2 diabetes, on the other hand, typically develops later in life and is often associated with obesity, insulin resistance, and impaired insulin secretion. Gestational diabetes occurs during pregnancy and can increase the risk of both maternal and fetal complications.

2. Classification of Diabetes Mellitus

Diabetes mellitus can be classified into several different types, each with its unique underlying causes and characteristics. The main classifications of diabetes mellitus include:

2.1. Type 1 diabetes (T1D)

Autoimmune diabetes: Type 1 diabetes is an autoimmune disease in which the body's immune system mistakenly attacks and destroys the insulin-producing beta cells in the pancreas. This leads to an absolute deficiency of insulin.

Age of onset: It often develops in childhood or adolescence but can occur at any age.

Treatment: Individuals with T1D require lifelong insulin therapy to maintain normal blood glucose levels.

2.2. Type 2 diabetes (T2D)

Insulin resistance: Type 2 diabetes is characterized by insulin resistance, where the body's cells do not respond effectively to insulin, and impaired insulin secretion from the pancreas.

Age of onset: It typically develops in adulthood, but due to rising obesity rates, it is increasingly diagnosed in younger individuals.

Treatment: Treatment may involve lifestyle modifications (diet and exercise), oral medications, injectable medications, and, in some cases, insulin therapy.

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2.3. Gestational diabetes mellitus (GDM)

Pregnancy-induced diabetes: GDM occurs during pregnancy when the body cannot produce enough insulin to meet the increased demands, often due to hormonal changes and the placental release of insulin-blocking hormones.

Screening and management: It is usually diagnosed during routine prenatal screening and can often be managed with dietary changes and exercise. In some cases, insulin may be required.

2.4. Monogenic diabetes syndromes

Genetic mutations: These are rare forms of diabetes caused by specific genetic mutations affecting beta cell function. Examples include maturity-onset diabetes of the young (MODY) and neonatal diabetes.

2.5. Secondary diabetes

Result of underlying conditions: Secondary diabetes occurs as a result of other medical conditions or factors, such as certain medications, hormonal disorders (e.g., Cushing's syndrome), or pancreatic diseases.

2.6. Other types of diabetes

Drug-induced diabetes: Some medications, particularly corticosteroids and certain antipsychotic drugs, can cause elevated blood glucose levels.

Disease-related: Some diseases, such as Hemochromatosis or cystic fibrosis, can lead to diabetes.

Pancreatic diseases: Conditions affecting the pancreas, such as chronic pancreatitis or pancreatic cancer, can cause diabetes.

It's important to note that while these are the main classifications of diabetes, the condition can vary widely among individuals, and some people may exhibit characteristics of more than one type of diabetes. Accurate diagnosis and classification are essential for tailoring effective treatment and management strategies for each individual.

3. Diagnostic Criteria

The diagnosis of diabetes mellitus is based on specific criteria established by medical organizations such as the American Diabetes Association (ADA) and the World Health Organization (WHO). (1) These criteria primarily rely on measuring fasting blood glucose levels, oral glucose tolerance tests, or hemoglobin A1c levels. According to the ADA, diabetes can be diagnosed if any of the following criteria are met:

Fasting plasma glucose (FPG) ≥ 126 mg/dL (7.0 mmol/L).

2-hour plasma glucose in the Oral glucose tolerance test (OGTT) ≥ 200 mg/dL (11.1 mmol/L).

Hemoglobin A1c (HbA1c) $\geq 6.5\%$.

4. Complication of Diabetes Mellitus

Diabetes mellitus is a chronic metabolic disorder that, when not properly managed, can lead to a range of complications affecting various parts of the body. These complications can be classified into two main categories: acute and chronic.

4.1. Acute complications

1. Hypoglycemia: Low blood sugar (glucose) levels can result from excessive insulin or certain medications. Symptoms include shakiness, sweating, confusion, and in severe cases, loss of consciousness. Prompt treatment with glucose or carbohydrates is necessary to raise blood sugar levels.
2. Hyperglycemia: High blood sugar levels, often referred to as hyperglycemia, can lead to diabetic ketoacidosis (DKA) in type 1 diabetes or hyperosmolar hyperglycemic state (HHS) in type 2 diabetes. These are serious conditions that can result in coma or death if not treated promptly.

4.2. Chronic complications

Chronic complications of diabetes typically develop over time due to prolonged exposure to elevated blood sugar levels. They can affect various organ systems:

4.2.1. Cardiovascular complications

1. Atherosclerosis: Diabetes increases the risk of atherosclerosis, the narrowing and hardening of arteries, which can lead to heart attacks and strokes.
2. Hypertension (High Blood Pressure): Diabetes can contribute to high blood pressure, increasing the risk of heart disease.

4.2.2. Kidney complications (Diabetic nephropathy)

Diabetes can damage the small blood vessels in the kidneys, leading to diabetic nephropathy. This can progress to chronic kidney disease and kidney failure.

4.2.3. Eye complications (Diabetic retinopathy)

Prolonged high blood sugar levels can damage the blood vessels in the retina, leading to diabetic retinopathy. This condition can cause vision problems, including blindness if left untreated.

4.2.4. Neuropathy (Nerve damage)

Diabetes can damage nerves throughout the body, leading to diabetic neuropathy. It can cause pain, numbness, and tingling in the extremities, as well as problems with digestion, sexual function, and more.

4.2.5. Peripheral artery disease (PAD)

Diabetes increases the risk of peripheral artery disease, which affects blood flow to the extremities and can lead to poor wound healing and limb amputation.

4.2.6. Foot complications

Nerve damage and poor blood circulation in the feet can lead to foot ulcers, infections, and, in severe cases, the need for amputation.

4.2.7. Skin complications

Diabetes can lead to skin conditions such as fungal and bacterial infections, as well as a condition called diabetic dermopathy, which causes skin patches.

4.2.8. Gastroparesis

Diabetes can affect the nerves controlling the stomach, leading to delayed stomach emptying (gastroparesis), which can result in digestive problems.

4.2.9. Altered immune function

Diabetes can weaken the immune system, making individuals more susceptible to infections, including urinary tract infections and skin infections.

4.2.10. Mental health issues

Diabetes can contribute to mental health conditions like depression and anxiety, which can negatively impact overall well-being and diabetes self-management.

It's important to note that proper diabetes management, including blood sugar control, regular medical check-ups, a healthy lifestyle (including diet and exercise), and medication when necessary, can significantly reduce the risk of developing these complications and help individuals with diabetes lead healthier lives. Early detection and intervention are crucial in preventing or delaying the onset of diabetes-related complications.

5. Recent Updates in Diabetes Mellitus

Recent advances in the understanding and management of diabetes mellitus have significantly improved the quality of care for affected individuals. Some notable developments include:

1. Continuous glucose monitoring (CGM): CGM devices provide real-time data on glucose levels, helping patients and healthcare providers make more informed decisions about insulin therapy and lifestyle modifications.
2. Insulin analogues: Newer insulin analogs have been developed to mimic the body's natural insulin production, leading to better glycemic control and fewer hypoglycemic episodes.
3. Personalized medicine: Tailoring diabetes treatment plans to individual patient needs is becoming more

common, thanks to advances in genetic testing and precision medicine.

4. Lifestyle interventions: Lifestyle modifications, including diet and exercise, remain key components of diabetes management. Recent research has emphasized the importance of personalized dietary recommendations and structured exercise programs.
5. Telemedicine: The COVID-19 pandemic accelerated the adoption of telemedicine, making it easier for individuals with diabetes to access healthcare remotely and receive timely guidance.

6. Conclusion and Discussion

Diabetes mellitus poses a significant global health challenge due to its increasing prevalence and associated complications, including cardiovascular disease, kidney failure, and neuropathy. Early diagnosis and appropriate management are crucial in preventing or delaying these complications. Recent advances in diabetes care, such as CGM, insulin analogs, and personalized medicine, offer promising tools to enhance the quality of life for individuals with diabetes.^{1,2}

Moreover, public health efforts must focus on diabetes prevention through education, lifestyle interventions, and policies that promote healthy eating and physical activity. By addressing the social determinants of health and reducing disparities in diabetes care, we can make significant strides in mitigating the impact of this chronic condition.

In conclusion, diabetes mellitus is a complex and pervasive disease that demands a multidisciplinary approach to diagnosis, treatment, and prevention. With ongoing research and innovations in diabetes care, there is hope for better outcomes and an improved quality of life for individuals living with diabetes.

7. Source of Funding & Conflict of Interest

None.

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