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Diagnostic criteria in different population for diabetes mellitus

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ABSTRACT

Diabetes is a chronic illness that requires continuing medical care and patient self-management education to prevent acute complications and to reduce the risk of long-term complications. Diabetes care is complex and requires that many issues, beyond glycemic control, be addressed. Type 2 DM forms more than 95 % of cases. In the last two decades, type 2 DM is on the rise, degree of which varies in different countries. The world health organization (WHO) has projected that global prevalence of type2 DM will more than double –from 135 million in 1995 to 300 million by 2025. Today, India has primary position in the global diabetes epidemiology map as it is the home of nearly 32 million diabetics, which is the highest number in the world and this is expected to increase to 80 million by 2030. The NDDG and WHO criteria for diabetes both permit a diagnosis based on the presence of the classic diabetic symptoms and random plasma glucose =200 mg/dl. Both also permit a diagnosis of diabetes based on FPG =140 mg/dl. In persons without unequivocal symptoms and in those with lower FPG, both require measurement of plasma glucose at 2 hours after a 75-g oral glucose challenge.The National Urban Diabetes Survey in India has shown standardized prevalence of diabetes and IGT to be 12.4%and 14% respectively with no gender difference .Subjects under 40 years of age had higher prevalence of IGT than diabetes (12.8 vs 4.6 :p<0.001). So India has garnered the notoriety of being the diabetic capital of the world.

Key words: Diabetes mellitus, diagnostic criteria, gestational diabetes.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder of carbohydrate, protein and lipid metabolism. It is the 3rd biggest disease[1] and characterized by persistent hyperglycemia and needs careful management by using drugs, diet control and mild exercise for the rest of lifetime. It is due to complete block of the synthesis of insulin (type – I diabetes) or due to decrease in secretion of insulin from ß-cells of islets of Langerhans of pancreas (type – II diabetes) [2,3]. Diabetes mellitus is a metabolic disorder initially characterized by a loss of glucose homeostasis with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both[4].

Without enough insulin, the cells of the body cannot absorb sufficient glucose from the blood; hence blood glucose levels increase, which is termed as hyperglycemia. If the glucose level in the blood remains high over a long period of time, this can result in long-term damage to organs, such as the kidneys, liver, eyes, nerves, heart and blood vessels.

The diabetic patients usually show varied symptoms of polyurea, polydypsia and polyphagia. In severe forms, weight loss may be seen, in some cases, symptoms may be absent, and consequently hyperglycemia may remain undetected causing vascular damage, even prior to the detection of the disease. Diabetics are prone to develop secondary complications like nephropathy[5], ketoacidosis[6], neuropathy[7], retinopathy[8], atherosclerosis[9] and cardiovascular problems[10,11]. In addition, diabetics are immunocompromised and are readily susceptible to microbial infections and more so with opportunistic fungal infections[12,13].

Classification[14.15]

In 1997, the ADA issued new diagnostic and classification criteria (1); in 2003, modifications were made regarding the diagnosis of impaired fasting glucose (IFG) (2) . The classification of diabetes includes four clinical classes**:**

- Type 1 diabetes (results from ß-cell destruction, usually leading to absolute insulin deficiency).
- Type 2 diabetes (results from a progressive insulin secretory defect on the background of insulin resistance).
- Other specific types of diabetes due to other causes, e.g., genetic defects in ß cell function, genetic defects in insulin action, diseases of the exocrine pancreas (such as cystic fibrosis), and drug or chemical induced (such as in the treatment of AIDS or after organ transplantation).
- Gestational diabetes mellitus (GDM) (diagnosed during pregnancy).

Insulin-dependent diabetes mellitus (IDDM)

- Low or absent levels of circulating endogenous insulin and dependent on injected insulin to prevent ketosis and sustain life
- Onset predominantly in youth but can occur at any age
- Associated with certain HLA and GAD antigens
- Abnormal immune response and islet cell antibodies are frequently present at diagnosis
- Etiology probably only partially genetic, as only ~35% of monozygotic twins are concordant for IDDM

Non-insulin-dependent diabetes mellitus (NIDDM)

- Insulin levels may be normal, elevated, or depressed; hyperinsulinemia and insulin resistance characterize most patients; insulinopenia may develop as the disease progresses
- Not insulin-dependent or ketosis-prone under normal circumstances, but may use insulin for treatment of hyperglycemia
- Onset predominantly after age 40 years but can occur at any age
- Approximately 50% of men and 70% of women are obese
- Etiology probably strongly genetic as 60%-90% of monozygotic twins are concordant for NIDDM

Gestational diabetes (GDM)

GDM may arise from the physiological stresses of pregnancy or it may be a degree of abnormal glucose tolerance that precedes pregnancy and is discovered during the routine metabolic testing that occurs during pregnancy. Characteristics of GDM are:

- Glucose intolerance that has its onset or recognition during pregnancy
- Associated with older age, obesity, family history of diabetes
- Conveys increased risk for the woman for subsequent progression to NIDDM
- Associated wlth increased risk of macrosomia

Other types of diabetes

Other types of diabetes includes diabetes secondary to or associated with pancreatic disease, hormonal disease drug or chemical exposure ,insulin receptor abnormalities or certain genetic syndromes. In addition to the presence of the specific condition, hyperglycemia at a level diagnostic of diabetes is also present. Causes of hyperglycemia are known for some conditions, e.g., pancreatic disease; in other cases an etiologic relationship between diabetes and the other condition is suspected[16,17,18].

Assigning a type of diabetes to an individual often depends on the circumstances present at the time of diagnosis, and many diabetic individual do not easily fit into a single class. For example, a person with gestational diabetes may continue to be hyperglycemic after delivery and may be determined to have infact type-1 diabetes. A person with steroid-induced diabetes may be normoglycemic after stopping steroids but develops diabetes years later after the current pancreatitis[19,20].

Epidemiology of diabetes mellitus

The prevalence of diabetes mellitus is increasing with ageing of the population and lifestyle changes associated with rapid urbanization and westernization. The disease is found in all parts of the world and is rapidly increasing in its coverage[21,22].

Prevalence and incidence of diabetes mellitus

Globally, the prevalence of diabetes, without type distinction, was estimated to be 4% in 1995. According to WHO, it is estimated that 3% of the world's population have diabetes and the prevalence is expected to double by the year 2025 to 6.3% [23,24]. There will be a 42% increase from 51 to 72 million in the developed countries and 170% increase from 84 to 228 million, in the developing countries. Thus, by the year 2025, over 75% of all people with diabetes will be in the developing countries, as compared to 62% in 1995[25].

Diagnostic Criteria

Diagnosis of diabetes defines a group at high risk for micro- and macro-vascular disease. The diagnostic criteria were established by the NDDG and WHO in 1979-80. For individuals with symptoms of diabetes, such as excessive thirst and urination or unexplained weight loss, only elevated FPG (=140 mg/dl) or random plasma glucose =200 mg/dl is required to confirm the diagnosis.

The NDDG and WHO criteria for diabetes both permit a diagnosis based on the presence of the classic diabetic symptoms and random plasma glucose =200 mg/dl. Both also permit a

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