

Epidemiology and Clinical Presentation of Type 2 Diabetes

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Keywords: diabetes mellitus, epidemiology, presentation, type 2 diabetes.

Epidemiology

Type 2 diabetes mellitus (DM), formerly known as non-insulin-dependent diabetes mellitus (NIDDM), accounts for 75–90% of cases of diabetes, depending upon ethnic background. The prevalence of type 2 DM in Western countries has traditionally been estimated at between two and six percent, of which half the patients are diagnosed and a similar number unrecognized. However, this figure is now known to be much higher in older people and non-whites. Over the age of 65 years, 10–20 percent of individuals are likely to be affected. In the nonwhite populations living in a western culture (e.g., Asians in the UK, Pacific Islanders, Pima Indians), between 10 and 40 percent of total adult populations have type 2 DM (see Table 1) [1]. It is estimated that the number of patients worldwide with type 2 DM will rise from 157 million in the year 2000–215 million by 2010 [2]. The regions with the greatest potential increase are Asia and Africa where diabetes could become two to three times more common than it is today. It is estimated that Asia will have 61% of this worldwide projected increased number of people with type 2 DM by the year 2010. It is felt that lifestyle changes, with diets high in saturated fat and decreased physical activity, together with increased longevity, are the main factors in this explosion of type 2 DM. The problem may be aggravated by intrauterine malnutrition [3]. More detailed analysis of these global estimates of diabetes as we enter the new millennium has recently been undertaken, reviewing the problem in different continents [4].

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Type 2 DM has previously been erroneously referred to as mild diabetes because it is often asymptomatic in terms of the classical symptoms of diabetes such as thirst and polyuria. However, it should be recognized as a silent killing disease where cardiovascular disease (CVD) is the principal cause of death for about 70 percent of type 2 DM patients [5]. Accelerating atherosclerosis may be present for many years before the onset of clinical diabetes. The life expectancy of a type 2 DM patient is reduced by between 30 and 40 percent for those in the age range of 40–70 years, a loss of eight to 10 years of life [6].

Characteristic Features of Type 2 Diabetes

The principal underlying defects in type 2 DM are a reduced sensitivity to the action of insulin (called insulin resistance) combined with an impaired ability of the β -cells of the pancreas to secrete sufficient insulin to overcome this resistance. Patients can have predominant beta-cell dysfunction, especially if not overweight, or predominant insulin resistance, especially if they are obese (which is usually the case). A late-onset type 1 DM is also recognized in patients over 65 years of age with predominantly β -cell dysfunction and presenting with a clinical picture of type 2 DM. This has been classified as late-onset autoimmune diabetes of adults (LADA) and identified by the presence of circulating antibodies to glutamic acid decarboxylase (GAD).

Type 2 DM begins insidiously and progresses slowly over many years. Initially, there may be few symptoms and after years of unrecognized disease patients may present with complications of diabetes at diagnosis (see below). The characteristic features of type 2 DM are summarized in Table 2. Genetic factors appear to play a role with regard to both the insulin resistance and impaired pancreatic β -cell function. However, it is well recognized that environmental factors also play a major role in the development of type 2 DM, and as

Table 1 Effects of race and age on prevalence of diabetes mellitus in Western cultures*

	Age	
	20–44 years	45–74 years
Non-Hispanic White	1.6%	12.0%
Black	3.3%	19.3%
Mexican Americans	3.8%	23.9%
Pima Indians	40%	65%
South-Asian Indians		16–20%

*Data adapted from Harris M (ed.) *Diabetes in America*, 2nd edition. New York: US Department of Health and Human Services, 1995.

mentioned above, these are principally high calorie intake and limited physical activity so that obesity is present in 70% of type 2 DM patients. Indeed, it is now recognized that type 2 DM is not a distinct clinical entity but rather a complex of risk factors for CVD. Type 2 DM is now better described as an insulin resistance syndrome or a metabolic syndrome, originally described by Reaven in 1988 as Syndrome X [7]. The syndrome describes the clustering together of certain cardiovascular risk factors associated with insulin resistance, the principal ones being obesity, glucose intolerance, hypertension and an abnormal lipid profile of high triglyceride levels with decreased HDL-cholesterol.

Clinical Presentation of Type 2 Diabetes

Type 2 DM may present to the clinician in one of 4 ways:

- Classical symptoms;
- Incidental diagnosis;
- Complications of diabetes mellitus;
- Hyperosmolar nonketotic coma.

Classical Symptoms

Symptoms of type 2 DM that may be seen at diagnosis are thirst, polyuria, fatigue and malaise, infections (especially genital candidiasis), and blurred vision. These symptoms, seen usually in older individuals, are not usually as severe in nature or as sudden in onset as those seen in younger type 1 (or insulin-dependent) DM, where there is a different aetiology

Table 2 Characteristic features of type 2 DM

<input type="checkbox"/>	Onset usually occurs in patients >30 years of age
<input type="checkbox"/>	Onset is often insidious
<input type="checkbox"/>	Positive family history in 30% of cases
<input type="checkbox"/>	Almost 100% concordance in identical twins
<input type="checkbox"/>	No association with HLA; no islet cell antibodies (as in type 1 DM)
<input type="checkbox"/>	Symptoms controlled by diet and/or oral hypoglycemic drugs; insulin treatment may be required later in the disease

causing the diabetes, namely an immune-mediated destruction of the pancreatic β -cells.

Incidental Diagnosis

Type 2 DM may be an incidental finding. Opportunistic urine and blood testing for glucose is often done in older individuals at the time of intercurrent illness, either at the primary or secondary care level, or as part of an annual health check. In population surveys, up to 50% of type 2 DM patients are relatively asymptomatic at diagnosis.

Complications of Diabetes

It is important to recognise that all diabetic patients are at risk of complications and type 2 DM may present with complications. Most of the morbidity and mortality associated with type 2 DM is attributable to the chronic complications of diabetes (Table 3). Diabetic complications have two major subdivisions:

1. Microvascular complications, which are specific to diabetes mellitus and do not occur in nondiabetic subjects. They are sometimes referred to as specific complications of diabetes. The principal sites that are damaged are the eye (retinopathy), the kidney (nephropathy) and the nervous system (neuropathy) and the clinical consequences can be blindness, renal failure and foot problems with risk of amputation.
2. Macrovascular complications which are not unique to diabetes but occur much more commonly in diabetic subjects. They are often termed nonspecific complications. The main large vessels that are involved are those supplying the heart, the brain and the legs (see Table 3). Thus, macrovascular disease gives rise to heart attack, stroke and gangrene.

Hyperosmolar Nonketotic Coma (HONK)

HONK is a form of diabetic coma seen in older type 2 DM patients. It is often seen at diagnosis in previously undiagnosed subjects. HONK is often associated with the introduction of thiazide or steroid therapy or seen after a major vascular event

Table 3 Chronic complications of type 2 DM

Microvascular disorders	> Retinopathy
	> Nephropathy
	> Neuropathy
	> Foot problems
Macrovascular disorders	> Cardiovascular disease
	> Cerebrovascular disease
	> Peripheral vascular disease

such as myocardial infarction or stroke. The patient presenting with HONK is usually drowsy or unconscious and severely dehydrated. Hospital treatment is urgent to give the subject intravenous fluids and insulin therapy, although after recovery, about 50% of patients will have satisfactory glucose control without insulin, by means of diet and oral hypoglycemic drugs.

Microvascular Disease and Type 2 DM

Diabetic Retinopathy

In Western countries diabetes mellitus is the most common cause of blindness in people between the ages of 20 and 60 years. About five to 10 percent of type 2 DM patients may have retinopathy at the time of diagnosis because of the insidious onset of the disease. This figure will rise to 30% at 10 years after diagnosis. In type 2 DM patients the threat to vision is from diabetic maculopathy which affects central vision. Laser photocoagulation therapy is successful in prevention of blindness in about 60–70% of patients treated provided the retinopathy is detected early. Therefore, regular screening for retinopathy at annual intervals is essential.

Diabetic Nephropathy

Diabetic renal disease affects 15–20% of type 2 DM subjects, in 50% of whom it will progress to renal failure. The incidence and prevalence are two to three times greater in those of Asian ethnicity. Diabetic nephropathy is now becoming the single most common cause of end stage renal failure. In Europe, over 10% of patients requiring dialysis or transplantation have diabetes mellitus and this figure is twice as high in the USA.

Diabetic Neuropathy

The commonest form of nerve damage is that of chronic peripheral neuropathy where appreciation of touch and pain are lost, followed by loss of proprioception in the lower limbs. The feet are numb, easily damaged by heat or minor trauma and ulceration can occur. Diabetic peripheral neuropathy is difficult to treat and the most important aspect of management is patient education in the basic principles of good foot care.

Diabetic Foot Problems

Foot problems are a major cause of morbidity in type 2 DM and one of the most common reasons for hospital admissions in diabetes mellitus. The diabetic foot represents a spectrum of disorders

ranging from vascular insufficiency, neuropathy and infection, to gangrene. Chronic sensory neuropathy (numb feet) is a major factor in 70–80% of diabetic foot ulcers and is usually a permanent feature. Preventive foot care is therefore essential in type 2 DM patients. The education of the patient in the basic principles of good foot care is essential and all patients must be seen regularly by a podiatrist.

Macrovascular Disease and Type 2 DM

Cardiovascular Disease

This is the major cause of death and hospitalization in type 2 DM subjects. Acute myocardial infarction (heart attack) is about two to four times more common in type 2 DM patients than in the general population and mortality from cardiac failure and heart attacks is also higher. A recent study from Finland showed that a diagnosis of type 2 DM, without a previous heart attack, carried a similar risk as that in the nondiabetic subject who had sustained a previous myocardial infarction, clearly illustrating type 2 DM as a potent cardiovascular risk factor [8]. The United Kingdom Prospective Diabetes Study (UKPDS) identified increasing age, blood glucose control, increased systolic blood pressure, raised LDL-cholesterol levels with reduced HDL-cholesterol levels and smoking as significant risk factors for CAD in type 2 DM patients [9].

Cerebrovascular Disease

Acute ischemic stroke and transient cerebral ischemic attacks are three to four times more common in type 2 DM.

Peripheral Vascular Disease

The incidence of peripheral vascular disease is increased by up to six-fold in type 2 DM. It may present as intermittent claudication, ulceration or gangrene. Lower limb amputation is up to 20 times more common in type 2 DM subjects.

In clinical practice, intervention techniques for diabetic macrovascular disease are often disappointing because of the severity and widespread nature of the atherosclerotic vascular disease. Most patients with type 2 DM die prematurely of macrovascular disease. Macrovascular mortality is 50% after 10 years of overt type 2 DM. Prevention is felt to be the best method of approaching the problem, but in type 2 DM especially, the disease may be diagnosed late after years of occult glucose intolerance in middle-aged individuals who already have extensive macrovascular disease at diagnosis. The early diag-

nosis of type 2 DM is important. Recent guidelines have stressed the importance of strict glucose, blood pressure and lipid control in type 2 diabetic subjects [10–12]. This morbidity and premature mortality is putting increased pressure on health care resources [13]. The UK Prospective Diabetes Study (UKPDS) has shown that in type 2 DM subjects good blood glucose control [14] and tight blood pressure control [15] can prevent complications or delay their progression. The early detection of retinopathy, nephropathy and neuropathy can lead to a reduction in the incidence of blindness, kidney failure and amputation due to diabetes.

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