



# Early-onset and youth-onset type 2 diabetes

## Early-onset type 2 diabetes

### Definition

Although definitions differ within the literature, a useful practical definition of **early-onset type 2 diabetes** is that which occurs in people **<45 years of age**. These people are of childbearing age if female, are entering what should be the most economically productive period of their lives and, often, will have young children and/or elderly relatives to look after. Thus, the personal and public health implications of developing type 2 diabetes at this age are severe.

Early-onset type 2 diabetes can be further categorised as **youth-onset type 2 diabetes**: that occurring in **children and adolescents** (see overleaf).

**Citation:** Seidu S (2021)

At a glance factsheet: Early-onset and youth-onset type 2 diabetes. *Diabetes & Primary Care* 23: early view publication

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### Prevalence

Prevalence is growing: the standardised incidence ratio of early-onset type 2 diabetes (diagnosis at age  $\leq 40$  years) increased from 217 per 100 000 population in 1996–2000 to 598 per 100 000 population in 2006–10.<sup>1</sup>

### Characteristics and clinical implications

Early-onset type 2 diabetes has a similar disease pathway to later-onset type 2 diabetes but is characterised by earlier and more aggressive insulin resistance. In addition, the longer time spent having the condition allows more time for diabetes complications to develop. Therefore, the condition has worse outcomes than later-onset type 2 diabetes:

- Cardiovascular risk factors and serious cardiovascular events are highly prevalent in this population.<sup>2</sup> Compared with a later onset, people with early-onset type 2 diabetes are:
  - Ten times more likely to have a stroke (30 times more likely than the population without diabetes)
  - Four times more likely to have a myocardial infarction (14 times more likely than those without diabetes).
- Nephropathy is the most common complication, occurring in up to 25% at diagnosis and up to 40% at 5 years after diagnosis.<sup>3</sup>
- Pregnancy complications and neonatal morbidity are exceptionally high compared with the general population:<sup>4</sup>
  - This includes a twofold increase in the rate of congenital malformations and a threefold increase in the risk of perinatal mortality.

### Clinical symptoms, signs and risk factors

Distinguishing between type 1 and type 2 diabetes at diagnosis is important but should be undertaken by specialist teams.

#### Typical characteristics of type 1 diabetes:

- Abrupt onset of first symptoms.
- One in four first present with diabetic ketoacidosis (often misconstrued as something else, e.g. viral gastroenteritis).
- Others diagnosed during health screening (incidental detection of hyperglycaemia).
- Some also diagnosed due to typical symptoms (polyuria, polydipsia, weight loss, fatigue).

#### Typical characteristics of early-onset type 2 diabetes:

- Slow and insidious onset.
- Signs of insulin resistance.
- Most common in overweight or obese patients of black, Asian or minority ethnic descent, in whom BMI cut-off points are lower.
- Strong family history of type 2 diabetes, cardiovascular disease or metabolic syndrome.
- More common in women, particularly those with a history of gestational diabetes.
- More common in those exposed to diabetes *in utero*.

#### Physical findings in type 2 diabetes may include:

- Obesity.
- Acanthosis nigricans.
- Polycystic ovary syndrome.
- Hypertension.
- Non-alcoholic fatty liver disease.
- Albuminuria.
- Retinopathy (higher rates of severe retinopathy in younger adults aged 15–34 years with type 2 diabetes compared to those with type 1 diabetes, both at diagnosis and at 10-year follow-up).<sup>5</sup>

## Management

### Screening

Those aged  $\geq 40$  years can be routinely screened through NHS Health Checks; however, it would be difficult to find the capacity to screen younger ages if the service is not commissioned. There is a strong argument for lowering the screening threshold given the personal and public health implications of early-onset type 2 diabetes.

### Multifactorial management

Early, aggressive management of blood glucose, lipids, hypertension and weight are warranted to counter the increased risk

of micro- and macrovascular complications in this population.

### Engagement

Engagement with health services is typically lower in people with early- compared with later-onset type 2 diabetes, as this group is more likely to be busy with work or caring for children and relatives.

### Pre-conception care and pregnancy

Particular care needs to be taken with women of childbearing age:

- They should be informed of the risks associated with unplanned pregnancy and have their medications and

contraceptive status reviewed.

- Those who are pregnant or planning pregnancy will need to stop glucose-lowering medications other than metformin and insulin, as well as ACE inhibitors, ARBs and statins.
- **Tight pre-conception glucose control is vital to reduce risk of congenital malformations.**

### Bariatric surgery

Although viewed as an extreme measure, bariatric surgery is a valid treatment option when considering the aggressive course and increased risk of diabetes complications associated with early-onset type 2 diabetes.

## Youth-onset type 2 diabetes (children and adolescents)

### Prevalence

Children diagnosed with diabetes should be assumed to have type 1 diabetes; however, over the past three decades there has been a surge in the incidence of obesity in children and adolescents, and an increased prevalence of type 2 diabetes. The first cases of type 2 diabetes in children were diagnosed only 20 years ago, but there are now around 800 children and young people with diagnosed type 2 diabetes in the UK.<sup>6</sup>

### Clinical implications

Those diagnosed with type 2 diabetes under the age of 18 years have higher rates of albuminuria, hypertension, dyslipidaemia, neuropathy and retinopathy than those with type 1 diabetes.<sup>7,8</sup> In addition, non-alcoholic fatty liver disease is present in up to 50%,<sup>9</sup> and their long exposure to cardiovascular risk makes a cardiovascular event during their working lives more likely.

### Risk factors

In addition to the risk factors for early-onset type 2 diabetes described previously, onset of puberty increases the risk (type 2 diabetes is rare before puberty):

- Behavioural changes: increases in junk food consumption and sedentary behaviour in adolescence.
- Hormonal changes (polycystic ovary syndrome).

### Diagnosis and screening

HbA<sub>1c</sub> is not the recommended test for diagnosis of type 2 diabetes in this age group. As type 2 diabetes is unlikely to have been captured through routine screening, most cases will present with symptoms, and rapid diagnosis is indicated:

- Fasting or random blood glucose testing is therefore recommended.
- Type 2 diabetes should be considered if the child is obese, of black or Asian origin, or if there is a strong family history of early-onset type 2 diabetes or other syndromes.<sup>10</sup>

### Management

- Children and adolescents with type 2 diabetes should always receive care in a specialist centre by a secondary care multidisciplinary team.
- Many more checks and aggressive treatment are required compared with later-onset diabetes; therefore, clinic visits are required much more frequently than with adult type 2 diabetes.
- Typically managed with diet and lifestyle change, metformin (from diagnosis, once metabolically stable) and insulin therapy (if metabolically unstable, elevated HbA<sub>1c</sub> or an uncertain diagnosis). Liraglutide is also approved for use in children as young as 10 years of age in secondary care.

## Relevant guidelines and recommendations

[NICE \(2015\) Diabetes \(type 1 and type 2\) in children and young people: diagnosis and management \[NG18\]](#)

[Diabetes UK \(2018\) Type 2 diabetes in children and young people: Position statement](#)

## References

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