

Are you worried your child is overweight?

Diet, hormones genes and the risks of childhood obesity, explained by a specialist.

Childhood obesity is by far and away most commonly caused by lifestyle choices, and has a familial multifactorial pattern but in very, very rare cases, hormones and single gene defects can be a cause. Dr Helen Spoudeas, a leading UK specialist in paediatric and adolescent endocrinology, provides advice for parents with overweight children - and explains how to avoid it - and the rare genetic and endocrine causes that exist.



At what age can childhood obesity become apparent?

[Childhood obesity](#) can become apparent at **any age**. Obesity is **particularly worrying if it is noted before 5 years of age and can manifest as early as the first year of life**. It is possible to unwittingly overfeed a baby - (especially if not breast fed or weaned early) - and think you're doing good, as growth (i.e. stature) is nutrition-dependent in the first year of life. Whilst this may ultimately lead to tall stature, it will actually also cause earlier puberty and make the child heavier.

How is weight measured?

Growth charts

Height and weight measurements on standard UK growth charts have been available since the 1960s and the most recent ones have been re-standardised to allow for our mixed-race population and our getting a little taller and considerably heavier since then. For decades they have been an important community screening tool (the handheld parental 'red book' record) for checking children's wellbeing. A child who 'thrives' is one whose weight increases steadily with age and height along its predetermined genetic potential. Significant discrepancies between weight and height, and/or shorter stature than expected from mid-parental targets, (especially if accompanied by excess weight), can signal problems much better than a screening blood test. **Percentiles** on growth (height and weight) charts show where a child is in relation to others of their age and sex and can be adapted to include parental targets. If a child is on or above the 90th percentile for weight and height this means they are respectively heavier and taller than 90% of children of the same sex, with 50% being average. Provided height and weight are on the same centile, this may be quite normal, but if by contrast, the child's height was much lower (e.g. 10th or 25th) this may signal problems and needs review.

Body mass index (BMI) and BMI centile charts

Because weight necessarily increases with height, the [BMI index](#) (expressed as Kg/m^2) was developed as a height-independent measure. It has been used to predict ideal weight in individual adults and their risk of premature mortality from the metabolic (type 2 diabetes) and cardio-vascular (heart attacks and strokes) consequences of being overweight ($>28\text{Kg}/\text{m}^2$) or obese ($>32\text{kg}/\text{m}^2$). Because children are always growing, a single BMI measure as used in adults, is unreliable. However, age- and sex-specific BMI centile charts constructed in the last two decades, have shown a worrying trend to increasing proportions of overweight and obese children in highly developed, westernised countries such as the USA and UK. This is largely attributed to modern diets, rich in sugars, which can re-pattern the infant's future metabolic handling even from within the womb in pregnancy. By definition, if a child is on or above the 90th centile on a BMI centile chart, he/she is clinically overweight (in keeping with a worrying 10% of children today) and if above the 98th centile, is clinically obese (some 2% children); both require referral.

Do genetic conditions cause obesity?

There is certainly a family tendency, (likely a combination of several as yet undefined genes), to obesity and also to Type 2 diabetes with which it is often eventually associated.

However single gene defects that cause obesity are very, very rare (accounts for <2% of obesity) and , usually occur as part of a wider condition in which obesity is very severe and present before the age of 5 years. These gene defects often disrupt the signalling from the deep midbrain, primitive central centre (hypothalamus), which controls eating along with other vital hormone processes (e.g., puberty, thirst). Children in whom these conditions are suspected may have markers of recognised genetic syndromes (e.g., Prader-Willi) and hence be eligible for genetic referral to make a diagnosis, or can be recruited into the national Genetics of Obesity Studies (GOOS) which have been ongoing for almost a decade at the UK national obesity research centre in Cambridge

In my experience, a lifestyle of overfeeding, too much sugar and a lack of activity is the main cause of childhood obesity until tests prove otherwise. Children who are overfed tend to be tall and heavy. If a child is short and heavy without a clear cause, then there may be an endocrine condition. This means that the endocrine system isn't producing hormones in the way it should for balanced growth.

What are other potential causes for childhood obesity?

Hormone Signalling Dysfunction

- Hypothyroidism – Untreated deficiency of thyroid hormone caused by either a severely underactive or undeveloped thyroid gland or disruption of the central hypothalamic – pituitary messaging hormone system
- [Cushing's syndrome](#) - a rare disorder caused by excess production or administration of the steroid cortisol, either from
 - an endocrine tumour in the central pituitary gland (called Cushing's disease) or
 - an endocrine tumour elsewhere
- from excess cortico-steroid medication (prednisolone, dexamethasone,) used to manage severe conditions like [leukaemia](#), brain tumours, [asthma](#) , rheumatoid and autoimmune diseases.
- **Hypothalamic Injury or Dysfunction**

- There is an increasingly recognised very rare obesity syndrome which develops from maldevelopment at birth (SOD syndrome) or acquired brain injury (brain tumours, surgery, accidents) **to the deep hypothalamus**. This is a serious disorder which does not readily respond to therapy and harbours wider hormonal and developmental disturbance
- Growth Hormone Deficiency may occasionally account for weight gain in children who have some form of hypothalamic maldevelopment or injury (e.g., brain tumours), but more often results in failure to grow, with thinness or average weight

When should a child be referred to a paediatric endocrinologist for obesity?

Children who fall persistently on or above the 90th to 95th BMI centile would benefit from medical review and advice on lifestyle changes. **We consider childhood obesity a pre-diabetic state and hence those who fall** persistently above the 95th to 98th BMI centiles require further endocrine assessment with a glucose tolerance test for insulin insensitivity- (sometimes manifest as dark skin discolouration in neck and armpit creases) - and diabetic risk -(frank diabetes is accompanied by excessive thirst and sugar in the urine) .

Most children who come to see a specialist will have already undergone thyroid function blood tests. If the tests indicate underactivity, a specialist referral is appropriate to consider the cause and treatment in its own right. However, the levels of thyroid hormone are rarely low enough in children to account for severe weight gain and further assessment may be required.

If there is a big centile discrepancy between a child's weight and height, either way, this may indicate a hormone disturbance and the need for specialist review.

What advice do you have for parents of overweight children?

99% of patients we see with obesity do not have an endocrine cause and are relatively tall (ie not short) The first step is to consider the potential for dietary change to eat more healthily and avoid the hidden sugar (glucose) in our western diets (even more than the fat which we've always done) .

My advice is lifestyle changes for the whole family:

- Look at the sugar content on the packet of what you buy and aim for **at least** under 3% (e.g. bran cereals may appear healthy but often have added sugar) .

- Follow a low glucose index (Lo GI) diet for the whole family. There is advice on the diabetes UK website <https://www.diabetes.org.uk/guide-to-diabetes/enjoy-food/carbohydrates-and-diabetes/glycaemic-index-and-diabetes>
 - Avoid too many fruit juices/smoothies and fizzy drinks (high in sugar) but enjoy the odd ice cream (low sugar, some fat)
 - Don't go hungry - Swap, sticky rice for basmati or brown rice white bread for rye, pasta for couscous, chips for baked beans and pulses
 - Cook food differently; white jacket potatoes may appear healthy due to their low-fat content but are high in sugar. Sweet potatoes, on the other hand, are low in sugar and fat. (NB avoid chips! – high in fat and sugar)
- If you also want to achieve relative weight loss, avoid high and saturated fats and choose high fibre and wholegrain foods, with low salt as healthy options.
- Increase daily exercise capacity – a 10% weight reduction will automatically improve health and metabolism.
- If you are concerned seek our help; dietetic, psychological and medical therapies can all help; it is much easier to achieve relative weight to height improvement whilst still growing than to lose excess weight once grown.

Avoiding obesity and consequent Type 2 Diabetes, **is the single most important preventable cause of chronic health problems and a premature death** for children today, akin to smoking in adults.

Dr Helen Spoudeas is a holistic paediatrician and endocrinologist with expertise in paediatric and adolescent growth and pubertal disorders, childhood obesity, thyroid and adrenal gland disorders, pituitary tumours and neuroendocrinology, and late consequences of childhood cancer. Visit her [profile](#) to learn more and discover how she can help your child.