

Etiology of Short Stature



Medical Author: Robert J Ferry Jr., MD

Medical Editor: Melissa Conrad Stöppler, MD

Short Stature in Children Overview

The term short stature describes height that is significantly below the average height for a person's age, sex, racial group, or family. Growth failure is often confused with short stature. Growth failure that occurs over time eventually results in short stature. By definition, growth failure is a medical condition. However, short stature is often a normal variant.



Short stature may or may not be a sign or symptom caused by a medical condition. The assessment of growth over time—not just a single point in time—is key in maintaining children's health. Any departure from a prior growth pattern appropriate for the child's genetic background may signal

the appearance of a disease.

Short Stature in Children Causes

All causes of short stature fall into one of three major categories: chronic disease (for example, malnutrition), familial short stature, or constitutional delay of growth and development ("late bloomers"). Worldwide, malnutrition is the most common cause of growth failure and is usually related to poverty or anarchy. Nutritional deficiencies in developed countries are more often the result of self-restricted diets. Poor weight gain is often more noticeable than short stature.

Children with familial short stature have short parents. These normal children display normal growth velocity (speed of growth over time), and their bone development is normal (as indicated by the bone age corresponding to the calendar age).

Children with familial short stature enter puberty at a normal time and typically complete growth with a height consistent with that of their parents.

Constitutional growth delay is a term used to describe normal children who are small for their age but who have a normal growth rate. Constitutional growth delay is characterized by delayed bone age, normal growth velocity, and a predicted adult height appropriate to the family pattern. Children with constitutional growth delay, often called "late bloomers," typically have a close relative who displayed constitutional growth delay. For example, the relative with late blooming may have had her first menstrual period when she was older than 15 years. A male relative with late blooming may have reached his final adult height after age 18 years.

Although rare, endocrine disorders, such as hypothyroidism (thyroid hormone deficiency) or growth hormone deficiency also cause growth failure. Short stature is commonly associated with genetic diseases, such as a SHOX gene mutation, Down syndrome, or Turner syndrome.

Short Stature in Children Symptoms

Short parents tend to have short children. Children with familial short stature do not have any symptoms related to diseases that affect growth. Children with familial short stature have normal growth spurts and enter puberty at a normal age. They typically reach an adult height similar to that of their parents.

Children with constitutional growth delay do not have any diseases. These children enter puberty later than their peers. However, because they continue to grow for a longer period of time, they catch up to their peers as they reach their adult height, which is normal and comparable to their parents.

Some symptoms may signal a medical condition causing short stature. The following symptoms should be further investigated by your doctor or health care practitioner:

- Child has stopped growing or is growing slower than expected (less than 4 cm, or 2 in, each year in the pre-pubertal child of elementary school age)
- Weight loss or gain (more than 5 lbs in a month)
- Poor nutrition/loss of appetite
- Delayed puberty (absent breast development by age 14 or absent menstrual spotting by age 15 for a girl or absent enlargement of the testes by age 14 for a boy); note that the presence or absence of pubic hair is not a reliable sign of pubertal development.

When to Seek Medical Care

Contact your doctor or health-care practitioner if your child is significantly shorter than most children his or her age, if you notice a decrease in his or her growth rate, or if the child has stopped growing.

Exams and Tests

The doctor or health-care practitioner will perform a complete history and physical examination, including measurements of the child's height, weight, limbs, and trunk. The doctor may perform blood tests to determine if the cause of short stature is related to a hormone deficiency or genetic disorder. Tests that may be performed include the following:

- To screen for growth hormone deficiency, a blood test to check levels of insulin-like growth factor-1 (IGF-1) and IGF binding protein-3 (IGFBP-3)
- To assess for blood diseases, a complete blood count
- To exclude hypothyroidism, blood levels of total thyroxine (T₄) and thyroid-stimulating hormone (TSH)
- To exclude Turner syndrome (a common cause of short stature in girls), a karyotype to detect chromosomal abnormalities
- To exclude SHOX gene mutations, a simple blood test for DNA analysis
- The doctor may take a simple x-ray of the left hand and wrist to assess bone age.

Other scans and special tests may be performed if a tumor is suspected to be the cause of delayed growth.

Short Stature in Children Treatment

Medical Treatment

Medical treatment depends on the cause of short stature. For children with normal variant short stature, generally no treatment is necessary. It is essential for parents to understand that growth hormone is not effective at increasing final adult height in children with short stature who are normal (that is, they lack disease).

Medications

Treatment with medication depends on the cause of short stature. Thyroid hormone replacement therapy is simple and effective for children with hypothyroidism. Recombinant human growth hormone therapy ([Somatotropin](#) of rDNA origin) is highly effective and safe for growth failure due to growth hormone deficiency and FDA-approved for several other conditions associated with short stature. However, growth hormone is not effective for normal children with short stature (that is, familial short stature). Growth hormone should be administered under the care of a pediatric endocrinologist.



Better Growth means Better Future

Surgery

Surgical treatment depends on the underlying cause of short stature. Surgery may be necessary if a brain tumor causing growth hormone deficiency is detected.



www.sedico.net

